ANGLIA RUSKIN UNIVERSITY

Primary school pupils' responses to lessons that combine different teaching styles (Visual, Auditory, Reading/writing and Kinaesthetic) according to their own personal learning styles

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by Behira Avni

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ABSTRACT

The study aimed to examine whether lessons that combine different teaching styles (Visual, Auditory, Reading/writing and Kinaesthetic- VARK) assist or hinder the learning of primary school pupils with different personal learning styles according to the pupils' responses.These lessons were given to three classes in primary school G in Israel (two in Year 5 and one in Year 6), a total of 75 pupils, for an entire school year. Before the experimental lessons were implemented the pupils in the research population completed the VARK questionnaire (in the form of a Hebrew questionnaire) to assess their learning styles. Mixed qualitative and quantitative methods were used to collect data concerning the pupils' responses to these lessons with three research tools: questionnaires, observations and interviews.

In the theoretical discourse on learning styles there is a controversy debating whether it is necessary to adapt teaching styles to the learning styles of pupils (Wehrwein, 2007; Carrier, 2009; Fountain & Alfred, 2009; Howles & Jeong, 2009; Naimie, et. al., 2010) or to teach with teaching styles that are different from pupils' learning styles in order to broaden the pupils' abilities (McCarthy, 1990; Tanner & Allen, 2004; Boella, 2010). The present research demonstrates that as long as the lesson integrates several different learning styles (VARK), each of them for a short duration during the lesson, pupils (even pupils who have special needs and new immigrant pupils) gain a lot in the lesson. The Visual element of the lesson was found to be especially meanningful in holding the pupils' attention and improving their understanding and motivation to learn, irrespective of their personal learning styles.

Research results showed that the combination of learning styles provided a variety that the pupils enjoyed and helped them to feel a sense of capability to learn. It was also clear that the elements of the lesson that did not correspond with their personal learning style did not hinder them, but often actually assisted them, increasing motivation and improving achievements. This was especially so for the weaker pupils. In one particular case of a child with special needs there was evidence of dramatic improvements in academic

achievements. The Kinaesthetic element, the teacher's Auditory explanations and the Reading element caused marginal problems for pupils who lacked these elements in their learning style. There were no significant differences between pupils with a single-element learning style and those with multiple-element learning styles. The Visual element was found to be most significant for most pupils and facilitated attention, recall and a sense of self ability. Irrespective of their learning style all the pupils felt that they were assisted by all the elements of the lesson and although the teacher's oral explanations were seen as a slight hindrance, the pupils reported that these explanations supported their sense of capability and this was especially so for pupils diagnosed with a Kinaesthetic learning style. It was also found that most of the pupils did not enjoy the Kinaesthetic work although they completed it successfully.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES IN APPENDICES

LIST OF GRAPHS

CHAPTER 1: INTRODUCTION

1.1 The Aim of the Study

The study aimed to examine whether lessons that combine different teaching styles (Visual, Auditory, Reading/writing and Kinaesthetic) hinder or assist the learning of primary school pupils with different personal learning styles, according to the pupils' responses. This was achieved by investigating which of the perceptive elements[1] of the teaching styles were experienced by the pupils as assisting their understanding and mastery of the studied learning material, their concentration abilities, memory and motivation in relation to their own specific learning style, attempting to determine whether certain elements were experienced as facilitating these processes, or if there were elements, which were experienced as hindering these processes because they were ineffective or superfluous or distracting.

The researcher's intention was to use the results of this investigation to recommend appropriate work methods to other teachers, relating specifically to the potential of a combination of different teaching styles for a heterogeneous class including pupils with different learning styles.

1.2 Personal Prologue: The Study's Background and History

As part of my work as a computer applications teacher-educator in a teacher training college, I sometimes visited a primary school to observe lessons. It was my impression that during the lessons, after a brief period of listening, the pupils chattered a lot, moved around, laughed and in general occupied themselves with issues unconnected to the lesson. The teacher was mostly occupied with

[1] The researcher used the VARK test to diagnose the pupils learning styles e.g. A or R or VARK or VAR. Throughout the thesis each constituent style within the pupil's learning style will be referred to as an 'element' of the pupil's learning style. For example: DJ was diagnosed with a VAR style and this style includes the V, A and R 'elements'. Similarly, the experimental lessons combined the use of teaching styles based on the VARK categories. Each of these teaching styles (Visual, Auditory, Reading/writing or Kinaesthetic) is also referred to as a teaching 'element' throughout the thesis.

disciplinary problems. This experience motivated me to conduct this study. I felt that there was a lack of adaptation between the way in which the teacher taught and the way in which the pupil was absorbing the learning. Being aware of the fact that different pupils have different learning styles, although they are exposed to a world in which multimedia is used to transmit knowledge in almost every field; I was interested in examining how pupils would react to a lesson that combined different teaching styles, according to the different pupils' own learning styles.

had little knowledge about learning styles, knowing only that it was posited that different pupils tend to use one or more different channels for learning: Visual, Auditory, Kinaesthetic, and reading and writing; so that while one pupil might learn best through Visual media, another would learn best through Auditory media or through a combination of Auditory learning and reading. This tendency forms the particular pupil's learning style.

During my search for theoretical and research literature on the subject of learning styles, I realised that I was drowning in an incoherent range of concepts and an overload of definitions under the umbrella term 'learning style', which merely resulted in ambiguity (Coffield et al. 2004). 71 models of learning styles were identified by Coffield et al. (2004) and most of them were criticised by these scholars (see Section 2.2).

Many articles have been published on the subject of learning styles, both for and against their veracity and applicability, e.g. Carol Wilson (2010) recently wrote that the only thing she believes to be important with regard to learning styles is that dealing with them contributes to a person's self-awareness. She criticises learning styles. Nevertheless I still maintain that the subject is relevant for research. As far as I could ascertain there has not yet been any study that investigated whether lessons that combine different teaching styles (Visual, Auditory, Reading/writing and Kinaesthetic) hinder or assist the learning of primary school pupils with different personal learning styles, according to the pupils' responses.

Several organisations have been established which recognise the differences between different learners and try to assist teachers and learners such as CAST Universal Design for Learning (UDL)(available at: http://lessonbuilder.cast.org) which offers a lesson builder for teachers and learners, or other organisations

which provide varied ideas for teaching and the use of technological means (Rose and Meyer, 2006).

Members of 'Generation Y' or the 'Net Generation' of the second millennium are connected to the online information highway, engage in very little writing and reading, and are exposed to a large amount of Visual and Auditory elements. This generation of learners may differ from previous generations that were not exposed to information on TV channels, computers and innovative mobile phone, yet they may still have different ways of absorbing knowledge and encounter difficulties in assimilating knowledge through different media. The author assumed that pupils with particular learning styles might find that their learning was hindered or assisted by teaching styles based on learning styles different from their own learning style and therefore the author believed that the time had come to examine this issue of adaptation of school lessons to the particular needs of the learner. It is also a fact that current technology is well enough developed to form lessons that combine the different learning styles (electronic board, see Section 2.4: Use of Multimedia in Education).

I was determined to explore this phenomenon since my own personal learning style had never suited the teaching style in the school in which I was learning. This incompatibility made my years in primary school almost unbearable; since I struggled to absorb the knowledge I was taught. As a college teacher and at a distance from my primary school years, I was curious to investigate and understand this phenomenon. The present study afforded me the opportunity to satisfy my curiosity.

1.3 The Context of the Research

Dissatisfaction is expressed towards Israeli primary school educational practice (Shoshani, 2004; Sharon, 2004, Ministry of Education, 2011). It is claimed that schools do not meet the needs of children and society since they fail to cope with under-achievement, gaps, alienation and ineffective education. It seems that new educational approaches are required. (Shoshani, 2004; Sharon, 2004) It is also claimed that an educational system that does not change is doomed to deterioration and failure (Almog, 2004).

Israel has committed itself to introducing consideration of learning styles in school, initially teaching this issue in the teacher training colleges, where the goal was to raise awareness of teaching students to the fact that learners have different learning styles (Bar Lev & Maoz, 1992; Rosenfeld, 1994). Shuster-Bouskila and Rabbe (2001) also attempted to integrate consideration of learning styles in a programme for English learning, in order to help pupils in comprehension of oral texts. With the introduction of computerised lessons in teaching, Shani and Nahmias (2001) examined the link between success of Year 8 and 9 pupils and different thinking styles in a digital environment. They found that a virtual course was particularly suited to pupils with a liberal thinking style and for pupils with an introverted thinking style, so that instructors teaching an on-line course need to consider this fact and to adapt their studies to their learners' preferred styles.

In order to assist teachers and lecturers, Goldstein et al. (2003) studied the learning style preferences of students studying at a teacher-training college and a technological college and found that most of the students prefer to study in active ways. Rosenfeld and Rosenfeld, 2004 prepared a special teacher-training college course to develop teachers' sensitivity to differences learning style. They found that teachers who themselves experienced these different learning styles and saw how they were expressed in their colleagues, became more sensitive to this issue.

Oshrat and Vidislavsky (2007) suggest that pupils learn the subject matter better when it is presented in a manner appropriate for their learning style. This opinion is shared by many researchers in different countries (Wehrwein, 2007; Carrier, 2009; Fountain & Alfred, 2009; Howles & Jeong, 2009; Naimie, et. al., 2010). In line with the fact that teaching now often focuses on guidance for the learner who uses the Internet, Carmi and Buhnik (2008) studied the relationship between thinking styles (global, local, extroverted, introverted, liberal and conservative) and learning functions, personal attitudes and student satisfaction in a virtual a-synchronic academic course. Although the virtual course offered varied learning possibilities these options were more exploited by learners with a liberal or introverted thinking style. A similar result was reported with a younger age group by Shani and Nahmias (2001).

Despite attempts to enrich primary school teachers in Israel with knowledge concerning learning styles, the link between this theory and classroom practice

remains weak. The researcher hopes that the present study will contribute practical knowledge to advance learning in this field and to narrow the gap indicated by Professor Almog (2004). The professor suggested that one of the reasons for the failure of the education system in Israel is the lack of correspondence between the pupil's learning style and the teaching method – the formal classroom is unsuitable for many learners.

Members of the Y Generation are well-versed in multimedia and rapid stimuli (Almog, 2004). One of the strategies employed in multimedia is the animated video-film. Under the auspices of the Technion University in Israel, Barak et al. (2011) investigated science lessons studies of all the Year 4 and 5 pupils in the town of Holon, and found that pictorial animations improved the pupils' understanding in science lessons.

1.4 Research Questions and the Gap in Knowledge

The following questions directed the research:

Research Question 1:

Does a combination of teaching styles hinder the learning of pupils with a particular learning style?

Research Question 1 A

To what extent do pupils with different learning styles exposed to teaching composed of additional teaching styles, differing from their preferred style, report problems with studying?

Research Question 1B

Which element of the integrated teaching styles assists or hinders pupils with particular learning styles?

Research Question 1C

Do pupils with a learning style that incorporates more than a single element experience more hindrance to their learning than pupils with a single learning element style when exposed to a combination of different teaching styles?

Research Question 2

Does a combination of teaching styles assist or hinder pupils with a particular personal learning style, according to their reports?

Research Question 2A

Do pupils with different learning styles report assistance or hindrance to their learning processes when exposed to a combination of different teaching styles?

Research Question 2B

Which element of the combined teaching styles is reported as assisting pupils with a particular learning style?

Research Question 2C

Do pupils with a combination of different learning styles that contains more than a single element report more assistance for their learning than pupils with a single element learning style?

Research Question 3

How did pupils with different diagnosed learning styles react to lessons taught with a combination of teaching styles?

How were these questions answered? Data used to answer the questions included: the researcher's impressions, the pupils' responses to the questionnaires, data from the observations during the experimental lessons and data from the interviews, all of which were fortified by triangulation.

The researcher found plentiful professional literature concerning the consideration of learning styles in the classroom. Already in 1971 researchers such as Kolb (1971) talked about introducing different combined teaching styles in the classroom lessons in order to respond to all types of pupil learning styles (Rose & Meyer, 2006; Rose, 2008). According to Richardson (1984) presentations that include both Visual and Auditory contents improve and increase pupils' learning achievements. Similarly Felder (2002) suggests a combination of several types of learning style and Willingham (2010) noted that although it is unnecessary to focus on the learner's learning style it is still important to combine different teaching styles to produce the maximum benefit and enjoyment for learners, strengthening

their motivation to learn. McCarthy (1980) suggests a practical model – the 4MAT System, dividing the lesson into four quarters where the teacher uses a different teaching style in each of these quarters so that each pupil can learn according to their personal learning style, and absorb the subject matter. This method poses a dilemma – what will the pupils do during the three-quarters of the lesson that are not taught according to their preferred learning style. Some scholars suggest that this contrast of styles will bring them closer to other different styles of learning and allow them to learn from different teaching styles (Boella, 2010). Others suggest that this division of the lesson will hinder learning during the inappropriate sections of the lesson (Wehrwein, 2007; Carrier, 2009; Fountain & Alfred, 2009; Howles & Jeong, 2009; Naimie, et. al.2010). It has also been suggested that a lesson that combines different teaching styles may also hinder learning, especially if the lesson includes several different types of activity and the pupils need to transfer attention from one activity to another (Yariv, 2010). Yet other researchers claim that the combination of Visual elements with other elements produces a cognitive burden for learners, which hinders their learning (Scaife & Rogers, 1996; Lowe, 2003), although the study in Israel by Barak et al. (2011) contradicts this finding.

Today, the development of technology, has led to further research concerning the issue of combined teaching styles (Rogers et al., 2009; Dede, 2009; Baytiyeh & Naja, 2010). Studies have investigated the appropriateness of distance learning, based largely on the use of multimedia by students and found that the students enjoy using this media and understand the subject matter well and develop a positive attitude towards the educating system (Baturay et al., 2010).

Although these studies are not directly parallel to the present study, it is noted that after the researcher conducted this research in 2004 a similar research diagnosed the learning styles of medical students using the VARK test (employed in the present research, see Appendices 3.1 - 3.3 and Section 3.7.2 Pre-Research Preparations) and taught lessons with a combination of the diagnosed learning styles of these students, examining whether the fact that they were told what their learning style was, improved the students learning (Rogers et al., 2009). Although the research questions in the above-mentioned study differ from those of the present research, there are lines of similarity with the present research in that the VARK test was used in that case to diagnose learners' learning styles and the

experimental lessons included all the VARK elements. The unique contribution of the present research is its examination of the responses of primary school pupils to similar experimental lessons (combining Visual, Auditory, Reading/writing and Kinaesthetic elements) according to their own personal learning styles.

The author believes the issue of learning styles is extremely complex and remains unclear. When different elements are combined together, does this combination hinder learners assessed with a clear Visual learning style – V – or do such learners benefit only from the Visual element of the lesson? Perhaps even the Visual element combined with other elements may pose a problem? Similarly would a student assessed as having the VARK learning style combining all the elements, benefit from teaching based on a combination of styles? Perhaps the Visual element in his leaning style is marginal compared to the other elements and would not be satisfied by this combination?

The present research does not deal with passive TV viewing, or with individual work on the computer, but relates to the employment of a combination of all the VARK elements with the teacher's intervention, including the human element of classroom pupils, teacher's feedback and a computerised presentation. Does such a complex combined system hinder the learning of pupils with particular learning styles or assist them? Does someone who likes to drink milk, also like milk with sugar and whipped cream? And would those who like their milk without additions and also like sugar without additions and like whipped cream without additions still enjoy milk with sugar and whipped cream? The replies to this metaphor are not unequivocal. This is even truer when it comes to the consideration of different learning styles in the classroom, an extremely significant issue when it comes to learning. A gap in existing knowledge regarding the significance of learning styles is obvious especially with regard to the status of learning styles in primary school learning. These dilemmas prompted the researcher to conduct the present study and to investigate primary school pupils' responses to lessons that combine different teaching styles (Visual, Auditory, Reading/writing and Kinaesthetic) according to their own personal learning styles.

As noted above, there has been no previous study that specifically investigated this issue, yet this issue intrigued me and led me to construct the research. It is hoped that the results of my research will broaden knowledge on the reactions of

pupils to a combination of learning styles, indicating whether this combination of styles helps or hinders pupils' learning, which element of the combined styles helps and which hinders, and which pupils (according to their learning styles) are assisted or hindered in this way. It is assumed that this knowledge can help teachers to adapt their teaching to their pupils needs so that pupils can improve the absorption and memorization of knowledge in order to improve achievements.

1.5 The Study's Boundaries

The study was conducted in primary school 'G' over a period of one school year, beginning in 2004. A lesson was given once a week in three classes: two Year 5 classes, (pupils aged 10-11), and one Year 6 class (pupils aged 12-13), with each lesson lasting 45 minutes.

The study related to Visual, Auditory, Reading/writing and Kinaesthetic learning styles, indicated in the VARK categorisation of learning styles (see Appendices 3.1-3.3 and Section 3.7.2 Pre-Research Preparations), The research did not include consideration of elements of other models of learning styles (See Section 2.2..1.1: Learner Types and Learning Styles below). Although the subject of learning styles is discussed widely in theoretical and research literature, this subject was considered to be beyond the scope of the present study.

As noted above, the study attempted to investigate primary school pupils' responses to lessons that combine different teaching styles (Visual, Auditory, Reading/writing and Kinaesthetic) according to their own personal learning styles. It was therefore considered irrelevant to other contingent areas of knowledge relating to school curricula, learning theories, and the issue of memory, or learning environments.

A certain limitation was inherent in the research due to the fact that in the year of the research, 2004, the VARK test had not yet been statistically validated. The researcher took great pains to compensate for this limitation (see Section 3.7.2 Pre-Research Preparations - Introduction) and her use of this tool was supported by the fact that the test was in fact validated eventually in 2010 by Leite et al.

1.6 Thesis Structure

The thesis is arranged as follows:

1. Introduction
2. Theoretical Perspectives
3. Methodology
4. Findings and data analysis
5. Discussion
6. Conclusions
7. References

CHAPTER 2: THEORETICAL PERSPECTIVES

2.1 The Context of the Research: Primary School in Israel

2.1.1 Introduction

The context of the research is the Israeli primary school system. This section provides details relating to primary school goals and to the various stakeholders involved in educational activities, including teachers, pupils and administrative and teaching staff, regular and special activities within the system and Israeli Ministry of Education policy on primary schooling including recommendations made by the last governmental Commission of Enquiry into the education system.

This context sets clear boundaries for the research. Other contingent issues such as the history of Israeli education, the schools' learning programme or broader pedagogic issues are not considered in this thesis. Since the study related to a state school, no background information is provided regarding for the ethnic and religious sector elementary schools that exist in Israel outside the state education system, similarly the present research does not relate to distinctive or alternative schools such as the Democratic schools.

2.1.2 Educational policy and objectives

According to the Compulsory Education Act, passed in 1949, school attendance is compulsory for all the children in Israel from age five to eighteen. The Compulsory Education Law stipulates that parents are responsible for sending their children at the right age to learn in suitable educational institutes (Ministry of Education, 2011). At age 5 every child must attend a recognised educational institution (nursery, then later primary school, middle school, and eventually high school) and fees are covered by the state.

During the school year the Ministry of Education sends inspectors to schools to supervise the teachers at work and to examine the pupils' progress for all age groups. This supervision includes 'Comparative Standard Examinations' for all

pupils. The Ministry of Education also evaluates the school for its learning culture and climate and not only for its pupils' achievements (Shedmi et al., 2007).

Primary schooling in Israel aims to develop pupils' personal, cognitive, emotional, social and moral abilities and to provide them with the basic tools that will allow them to lead valuable, meaningful lives, both as individuals and as responsible citizens. The schooling system endeavours to stimulate pupils' curiosity and exploration, respect for learning and the acquisition of knowledge. It aims to develop their sensitivity to others and to increase their commitment to and involvement in the society in which they live (Dovrat et al., 2005). The system is also designed to protect the pupils' wellbeing while they are in school (Shedmi et al., 2007),

as individuals and as a group, in compliance with state legislation and the Ministry of Education, Director General's regulations. The Director General of the Ministry of Education and the ministry staff are obliged to uphold the rights of all educators and educational management and to promote their personal and professional welfare.

The primary school system in Israel includes children aged 6-12 (Years 1-6). Formal primary school education commences after children have completed nursery school and have been judged suitable by their nursery school teacher and counsellor to enter the first grade. Each primary school includes six grades according to year groups and the number of entry classes for each year group depends on the age profile of the school zone population.

Each classroom includes between 35-40 pupils. The school day extends from 08:00-13:00, with younger students studying until midday. Occasionally, when there is a shortage of classrooms and/or teachers, a second teaching shift is introduced in the afternoons.

Schools operate six days a week, from Sunday to Friday inclusive, except in the case of certain minority group schools (e.g. Moslem or Christian), in which school days are adjusted according to specific religious requirements. The Dovrat Commission (Dovrat et al., 2005) recommended changing primary schooling to five days a week and extending school hours from 08:00- 15:00. This recommendation has already been implemented in some school districts.

At the end of the school year, in addition to preparing school reports, a school pedagogic committee meets to decide whether a pupil is eligible to progress to the next year, repeat the year or leave the school. This decision is based on evaluation of the student's achievements by the class and subject teachers. Current policy in most primary schools is to avoid recommendations that pupils repeat a year or be excluded from the school.

2.1.3 Choice of registration zone

The Ministry of Education has divided Israel into different zones, each centred on a defined school. From age six, schooling is compulsory and a child must be registered at the school in his or her zone. A school manager cannot refuse to register a pupil who resides in that specific zone, and by law cannot register a pupil who lives outside the registration zone. In the past, children whose parents attempt to register them at schools outside their specific registration zones are transferred to their appropriate zones. Today there is some choice in schooling regarding where a pupil wishes to study. Pupils may apply to three different schools, but at the same time a place is guaranteed in the school in the zone in which the child resides (Lavi & Shild, 2003).

Within the schools, classrooms were traditionally divided into those for regular pupils and those for pupils requiring special care. However, the trend today is to integrate pupils requiring special education within the mainstream classroom, although they are given auxiliary lessons modified specifically for their special needs with appropriate teachers outside their class.

2.1.4 Primary school infrastructure

The present research was conducted in an urban school. Usually in urban areas, schools are located in buildings comprising several floors, and to varying degrees on sizeable pieces of land with playgrounds and 'green' corners, all enclosed by a safety fence. Inside the building, the first floor tends to be occupied by management rooms, the school's administrative offices and a staff room. Years 1 and 2 also usually occupy classrooms on the first floor. Other classrooms are located on higher floors according to the pupils' ages. All windows are usually

barred for the pupils' safety and to prevent people entering school premises without permission.

Each school has a library and may have one or more reading rooms, often containing special resources such as curricula textbooks.

Most primary schools also have computer rooms where different learning activities are conducted. The Israeli Ministry of Education has begun a programme to ensure that every primary school has a computer room.

The primary school has a gym for sports activities, which is often also used for ceremonies relating to different holidays and traditions.

A large reinforced bomb shelter, equipped with chairs and washrooms is usually located in the basement of the school for emergencies, particularly for times of war or terrorist attacks. Schools regularly conduct practice drills for quick and safe evacuation to the shelter. In the past, when Israel was a young country with a high proportion of new immigrants, government policy stipulated that educational institutions were responsible for the health and nourishment needs of young children:. At that time, pupil's dental needs were also met in dental clinics attached to each school. A well-equipped first-aid room with a nurse in attendance was also part of each primary school.

In the past, there was a strong emphasis on introducing and teaching work ethics to primary school pupils and every school had a garden where the pupils were responsible for preparing the soil and sowing seeds in the appropriate season, and weeding and watering the garden.

Today the dental clinics, agriculture lessons, in-house meals and nutrition education as well as immunisation are the responsibility of the family. Pupils now bring their food in a lunch box which they eat in the classroom at 10:00 and then eat lunch at home after school. Children whose parents work late go to playgroups or child-minders until their parents pick them up.

Since Israel is a diverse country with quite a few minorities and different religious sectors, such as orthodox religious, traditional religious and secular, In addition to the mainstream education system, each religious group or ethnic minority (e.g. Arab Christian, Moslem and Druze, Circassian, Armenian) has their own school/s. These minority religious or ethnic group schools are also state supervised and

subsidised schools. In Israel there are also private, open, democratic, international and anthroposophist schools. The visions of these schools are determined by their particular ideologies

The Jewish religious state education system provides services for children whose parents hold a wide range of religious views, from ultra-orthodox Jews to those who are not observant Jews but wish their children to be educated in a religious environment. These schools are subsidised and supervised by the state. Additionally there are some private religious schools.

There are often noticeable socio-economic differences between different ethnic sub-groups of the Jewish population, so that in large Jews of Western Ashkenazi origins tend to be financially well-established in contrast to Oriental Sephardi and African origin Jews (Kill, 1997; Shvarzfeld, 1999).

This broad variety of publics has a variety of demands, emphases and requests, concerning the education of their children creating serious challenges for the education system.

2.1.5 Primary school organisation and learning content

The following subjects are taught in Israeli primary schools: mathematics, literature, Bible studies, English (sometimes Arabic also), science, geography, Hebrew grammar, sport and art.

The number of staff working in any school depends on its size. The head-teacher is responsible for school administration and manages school policy. Other staffs include secretaries, an educational counsellor, psychologist, librarian, subject teachers and maintenance personnel. Each class has a 'class teacher', whose job is to provide direction for the class, to mediate between the pupils, the management and the parents, to supervise classroom behaviour, discipline and the social agenda ('the class-teacher's hour', pupils' committees, social games), the decoration of the classroom, organisation of parties and ceremonies, field trips and the pedagogical programme (Ministry of Education, 2011).

To qualify for teaching, teachers must have completed either a four year B.Ed. programme at a teacher's college or have a B.A. degree and an academic teacher's certificate. The Israeli Ministry of Education employs all teachers.

A typical daily school timetable would be performed as follows: school starts at 08:00 with school assembly in the playground. Pupils stand in line with their class teachers. The head-teacher greets the pupils and makes general or specific announcements regarding the school day. On festivals or at graduation assemblies, some of the pupils help with organisation of the assembly (under the supervision of their class teacher and the music teacher), sing songs, read stories, recite poems or dance (folk dances). This also occurs on special days, such as a National Memorial Day, Jerusalem Day and Holocaust Day. Following morning assembly, the pupils are supervised to walk to their classrooms in an orderly fashion. In Years 1 and 2, the class teacher teaches most lessons, whereas in more senior classes subject teachers teach the different subjects such as grammar, Bible studies, science, mathematics and English. Lessons last for 45 minutes with a short five-minute break in-between lessons. Most lessons are taught in a traditional frontal style. At the beginning of the lesson teachers relate to homework, then the teachers present new subject matter which the class then discusses and this is often followed by a class exercise related to the new subject and this sometimes involves the pupils working together in groups.

At 10:00, before the long break, time is given for the pupils who have brought food in their lunch box from home, to eat in the classroom, after which they go out for a 20 minute break to the school playground.

Each class appoints a weekly monitor, whose job before also going downstairs to play, is to ensure that the classroom is clean and tidy, that all the pupils have left the classroom and that the classroom remains empty and is locked. This enables the duty teacher to stand in the playground to control (stop fighting) and supervise (ensure that no pupils leave the school grounds) all the pupils at play in one area. If the weather is unsuitable for outdoor play the pupils remain in their classrooms during the long break. The ringing of a special bell marks the commencement and end of breaks, or the school day.

2.1.6 Holidays

Israel celebrates eight commemorative days so that together with other festivals pupils are absent from school for a total of 35 days per annum. Since this totals a considerable amount of time, Israeli primary schools do not have additional holidays after each of three terms as in other countries in the Western world.

2.1.7 Parents' day

Pupils study during three semesters and are examined at various points during the year (depending on the school), in order to assess their achievements. At the end of each semester the teachers hold an evaluation meeting, where they discuss each pupil's progress in depth. At the end of this meeting the class teacher summarises the discussion for each pupil, and this summary is presented to the pupil's parents on Parents' Day.

On this day parents are invited individually in the afternoon to meet the class teacher and the different subject teachers. At the meeting the teacher' presents evaluations and recommendations regarding the pupil's achievements and behaviour to the parents together with additional relevant remarks. After Parent's Day, the pupils receive a report, in which most of the schools write a numeric grade (ranging from 0 to 100) for each subject. For younger pupils, grades will be presented according to set categories – 'excellent', 'very good', 'good', 'almost good enough', 'not good enough'. In some schools however, it is acceptable to write a verbal evaluation of pupils' progress in each subject in a few words.

2.2 Learning Styles

Learning styles have been identified since the 1920s (Jung, 1921 – see below) and continue to be investigated until the present in the context of traditional classroom learning (Baykan & Nacaz, 2007; Rogers, 2009 Ozpolat & Akar 2009; Naimie et al., 2010; Dobson, 2010; Roberge et. al., 2011) and in the context of on-line learning (Wang et al., 2006; Hu et al., 2007; Sun et al., 2008). Although some scholars such as: Boella (2010) and Willingham (2010) now tend to think that it is unnecessary to pay attention to learning styles, the experience of the researcher in

the education field leads her to believe that it is important not to ignore the understanding offered by the identification of learning styles. Different people are distinguished by the way in which they absorb information and learn. This intuitive approach of the researcher is supported by thousands of studies relating to learning styles, and 71 models that define and explain learning styles (Coffield et al., 2004). In the present era technology has become an easily accessible and familiar tool with which it is possible to promote pupils' learning and also to study this issue of learning styles (Rose & Meyer, 2006; Dede, 2009; Rogers et al., 2009).

Jung (1921) and Tyler (1965) attempted to describe different personality types. Their theory served as a foundation for the development of models and inventories that categorised people according to the way in which they absorbed learning and thus help them to choose their higher studies and occupations such as Briggs Myers (Myers & Myers, 1995) or to inform learning and teaching in school such as Dunn and Dunn (1972, 1993).

Many different categorisations have led to ambiguity and a lack of clarity concerning the definition of learning styles. Some scholars have tried to create models including all types of categorisation (such as Curry's Onion model,1987, see below) while Silver et al. (1997) indicate that all categorisations can be divided into two types, those relating to different personality types and those relating to different cognitive types.

This section provides a short survey of the development of learning style theory from its conceptual origins in personality types to educational practice today in universities and in primary schools such as the presently studied school. The survey describes key theories in this field and some less major theories that were found relevant to aspects of the present research.

2.2.1 Development of Learning Styles

2.2.1.1 Learner Types and Learning Styles

Jungian Personality Typology

Jung's theory is seen as the forerunner of all learning style theory. He indicated eight personality types. This was a broad ranging theory. Although learning styles

are not explicitly mentioned in Jung's typology it is possible to deduce these styles from the descriptions of the different personality types. Despite the fact that it was written in the 1920's, until today Jung's typology is constantly referenced and re-analysed within the context of newer models (Goodwyn, 2010; Gullatz 2010).

A significant part of Jung's book, *Psychological Types* (1921) is devoted to the description of introversion and extroversion which Jung considers the basic individual tendencies of any human, that characterise particular mental approaches towards the world and its reality. These approaches guide, to some extent unconsciously, the entirety of human experiences, and have a dominant influence on components of the personality and their development. Jung notes that these two approaches merge within each person; both are necessary in order to survive and function.

Jung reasoned that the personality type develops in childhood, and that both modes could be found in every person, but the preferred mode will exploit most of the individual's power and the secondary mode will be 'a suppressed minority'. The preferred mode will be expressed in the conscious personality and will reflect its goals, desires and achievements and it will always be revealed spontaneously, positively and constructively. The secondary mode, contradicting the first, only exists partially in the consciousness, mostly existing in the unconscious and is liable to assume a negative, undeveloped and primitive character. Thus, a person who is consciously extroverted, may be unconsciously introverted and vice-versa. In principle, every person adapts to some extent to their reality mainly through one of these dominant approaches.

Jung (1921) attributed equal importance to both these approaches, since he recognised man's need to communicate, both with their inner world causing them to turn their *libido* inwards, and also with the external world, leading them to express their *libido* outwards.

This mental energy (*libido*) is invested in events and objects in the external environment and in turn is influenced by them. According to Jung (1921) a pure extrovert (as a theoretical type) is one whose behaviour is guided by facts. This person's thinking, feelings and acts are directly influenced by events in their immediate or more distant environment, and they tend to adhere to the 'here and

now'. The extrovert relates with a large extent of consciousness and attentiveness to the external world. Decisions and actions are determined by objective conditions. The object, and not the personal, subjective opinion plays a central part in the extrovert's consciousness. The extrovert is conformist, sociable, easily adapts to circumstances and does not invest efforts to break out beyond these boundaries (Harel, 1995).

In contrast, when there is an introverted orientation, mental energies are invested in the individual's inner world in personal experimentation and experiences. The pure introverted type is attentive to the inner world as a result of experiences that the individual has undergone, dealing more with an examination of the quality of these experiences instead of their substance. The introvert's opinions are influenced by what happens in this inner world and this is given greater weight than what happens in the external world. Thus, most behaviour is controlled by internal impressions and not by the events themselves. The introvert prefers the world of thought and ideas to the world of practice, and focuses on this world. Gifted with more emotional profundity, introverts are non-conformist and less socially involved.

In addition to these two basic approaches, Jung (1921) divided people's personalities into four categories, according to four mental functions, each function being characterised by a specific orientation to understanding events and experiences in the environment.

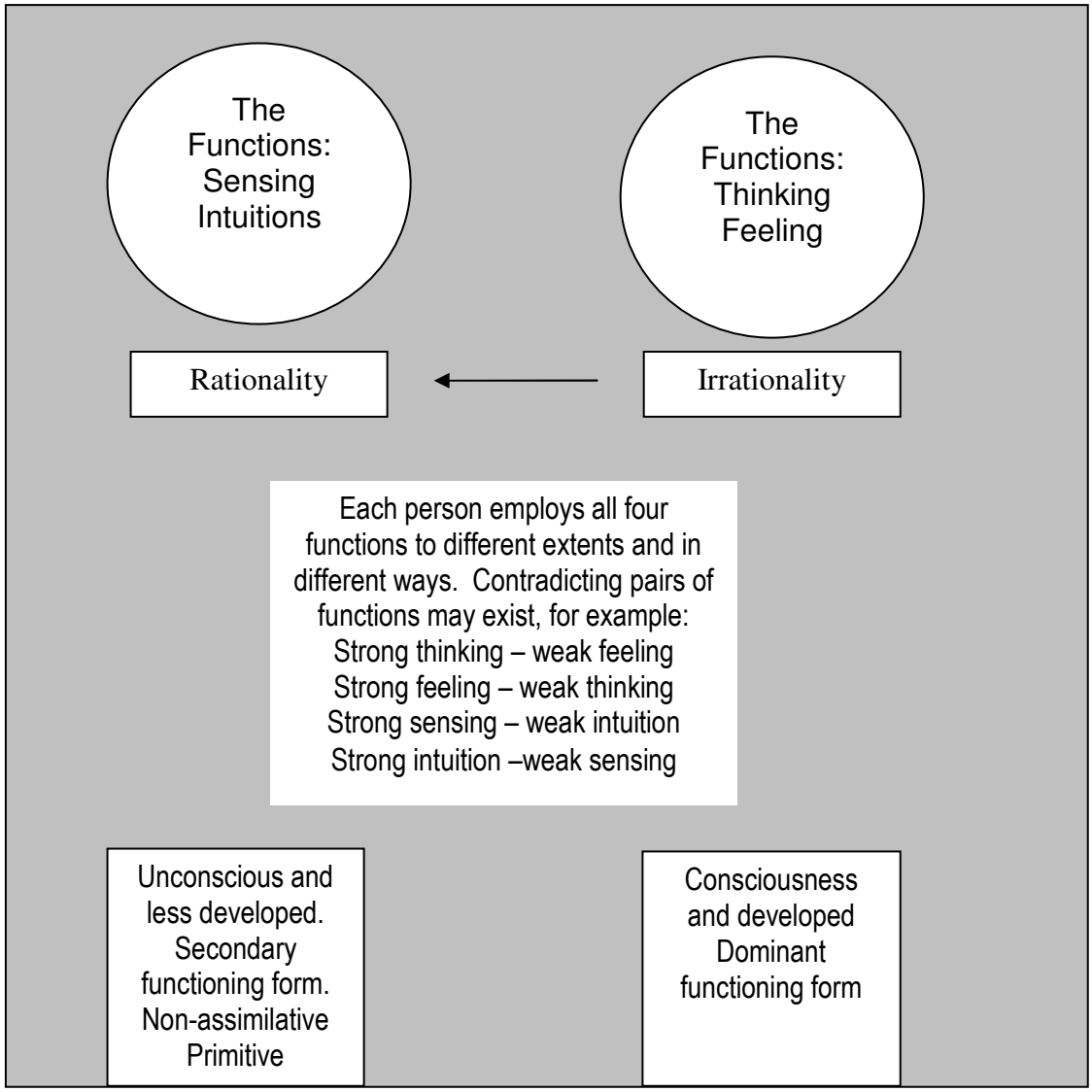
- *The sensing type* Relating to the world through the senses, this function enables information to be absorbed from the world, without organisation or evaluation of the information. Sensation is a primitive, passive form of functioning. A person with sensory awareness will focus on seeing and absorbing concrete details of things.
- *The thinking type* Relating to the world through ideas and intellect. Thinking is used to define things that are absorbed through the senses, providing logical meaning to information that is registered in the consciousness. Thinking distinguishes between different details by organising and categorising them and creating causative links between them. The thinking type is characterised by consistency and objectiveness, and the ability to

deduce conclusions and make decisions through analysis and calculation of data and judgment. The thinking type can therefore solve problems by logical analysis.

- *The feeling type* Reacts to the world on the basis of the affective quality of individual experience. The feeling type grants value or subjective judgment to things that the person feels, experiences or registers in the mind. This forms consideration concerning the value of the information for the individual, and also whether it is desirable or pleasant. The feeling type does not focus on problem-solving, but rather on its human aspects and the feelings that it engenders.
- *The intuitive type* Beyond all cognitive functions, this type relies on a deep internal understanding sense, originating in the unconscious, which is not grounded in external reality, but rather linked with the time factor. This is a spontaneous perception of the facts in such a way that it cannot be explained by conscious intellectual analysis, but by spur-of-the-moment ideas, insights or a sudden internal epiphany, which may also relate to future events, intuition reveals the possible and meaningful relations embodied in things. The intuitive type seeks for meaning beyond the immediate view, with internal feelings towards things and takes an interest in their potential possibilities, in the substance of the matter.

Jung (1921) divided these four functional types into two groups: the two perceptive functions, sensing and intuition are considered irrational, since they go beyond the area of logic. The functions of thinking and feeling are rational functions, since they represent two manners of decision-making. Thinking links ideas through rational conceptions, while feeling directs judgment through the consideration of personal and social values. In all, Jung (ibid) relates to eight personality types since the four functional types may either be associated with an introverted approach or with an extroverted approach (see Figure 2.1 below).

Figure 2.1: Jungian Theory



Similar to the dynamics of the approach types, Jung assumed that each personality contains all four functional types, but one of them will be dominant and more outstanding and will be expressed more frequently and consciously. For most people the two approaches and four functioning types will exist to different extents and in different form. Some will be more conscious and stronger, while others are unconscious and weaker (Harel, 1995).

Witkin (1962) delineated a simpler typology of two main learner types:

- Field dependent learners who prefer to put an emphasis on personal relations, focusing on the teacher and the learner.

Field independent learners who prefer facts and models, focusing on the teacher

The Myers-Briggs Model

These views of Jung, Taylor, and Witkin constituted the foundation for the work of later researchers who related to 'learning styles'. In 1940,Jung's theoretical conceptualisation inspired Katherine Cook Briggs and her daughter Isabel Briggs Myers to create a practical tool known as The Myers-Briggs Type Indicator (MBTI) that categorises 16 different types or archetypes of learner, based on the way in which each type views their environment, makes decisions, focuses on their internal world of ideas and concepts and on the external world of people and things and also on the reaction of the learner to a given situation, or the learner's judgmental approach (Wilson, 1998). Later Myers-Briggs (1980) and also Keirsey (1998) used their research findings to expand this conceptualisation and formed a gallery of sixteen types relating to the cognitive dimension ranging between perception and judgment. They believed that this expansion was essential, since Jung's typology was difficult to identify in practice in daily life. This was because his theory had grown out of his observations of his clients, and also because Jung focused primarily on describing dominant functions and preferred attitudes, without relating to the balancing effect of additional auxiliary functions (McCaulley, 1981). In the opinion of Myers-Briggs (1980), auxiliary functions are important since the extrovert assistor (socialite type) enables the introvert (inward type) to access both their internal world (feeling) and the world of ideas (thinking) and thus to master both types of functioning and in parallel to conduct processes of perception and judgment.

This tool (the MBTI) was intended for use with adults and was used for more than 50 years. It is still used widely in the medical profession in order to help advanced students to decide on their area of specialization (Coffield et al., 2004).

The Mind Styles™ Model of Gregorc

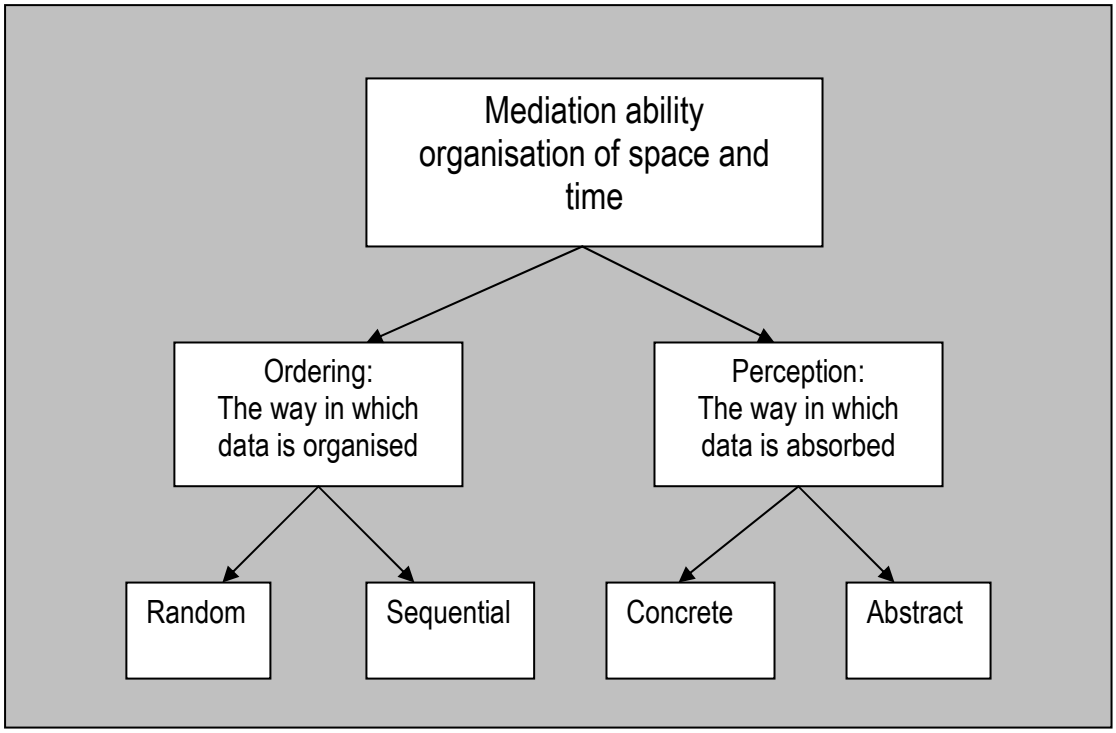
Anthony Gregorc dealt with the learning styles of adult learners, refusing to create an inventory that would relate to younger pupils since he felt that it was impossible to rely on their self-reports (Gregorc, 2002). In 1969, Gregorc was first recognized for his work on the Energic Model of Styles based on the theories of Jung (1921). The model relates to the way in which people absorb abstract or concrete information, and the way in which they process data (Gregorc, 1979). In 1982 Gregorc posited that people differ in the way that they organize their space and time.

Later, Gregorc (1984) developed the Mind Styles™ Model, explaining explained that people's behaviours reflected their personal styles of learning and the way in which they assimilate within their environment. Thus, observing a person's behaviour enabled him to diagnose that person's learning style. The individual apparently has two significant types of mediation ability:

- Perception (the way in which they receive information) and
- Ordering (the way in which the information is systemised and deposited)

Perception has two qualities: abstract and concrete. There are two dimensions of ordering: sequential and random. Figure 2.2 below presents a graphic image of this model.

Figure 2.2: The Mind Styles™ Model of Gronic



As in the model suggested by Kolb (1984, 1985, see below) these different dimensions are combined to form four different learning styles (Gregorc, 1982a):

1. concrete-sequential – the learner is organised – aims for perfection, both in thinking and practice
2. concrete-random – the learner is logical, acting analytically and rationally, evaluating things.
3. abstract-sequential – the learner is sensitive, variegated, acts emotionally and spontaneously.
4. abstract-random – the learner is intuitive, independent, acting originally and impulsively.

.Gregorc argues that the mind acts reciprocally with the environment through different channels. The four most important channels outline ways to absorb and express information – this is known as the Gregorc Style Delineator™ (GSD).

The Theory of Kolb

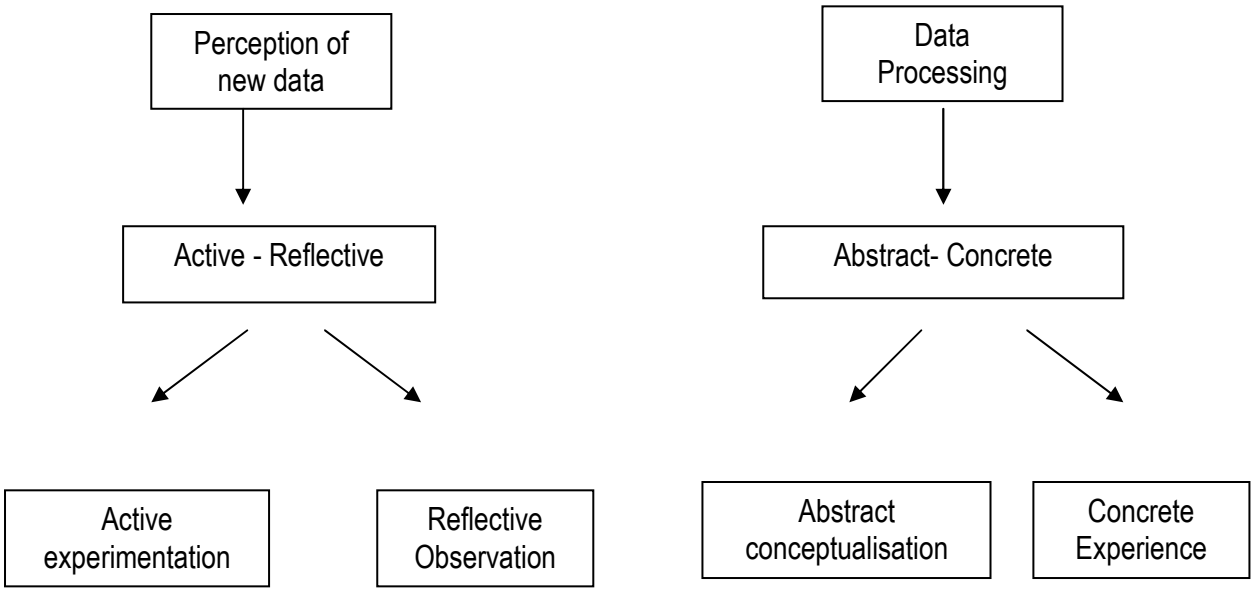
Also within the context of adult learning, Kolb (1971) began to classify students according to their preferences for different learning activities. These preferences were first mentioned in the theory of experiential learning (Dewey, 1933; Lewin, 1951) which sees learning as a continuous process based on experience (see Appendix 2.1: Teaching Methods).

Kolb believed that everyone has a dominant learning style but effective learning involves a combination of styles. According to Kolb (1983) a learning style is reinforced by a person's self-perception, and everyone can strengthen their ability to act according to their learning style as they wish, and to create a significant learning experience as a basis for their development (Kolb, 1983). This approach contradicts theories that indicate that learning styles are based on genetic factors (Tendy & Geiser, 1998-1999).

The theory of Kolb (1985) proposes two dimensions relating to the ways in which people learn. The first dimension describes the way in which people perceive new information. This can be described along a continuum from concrete to abstract, for example, in unfamiliar situations, there are those who prefer to sense their environment (concrete experience) in contrast to those who prefer to plan their path in a pre-determined fashion (abstract conceptualisation).

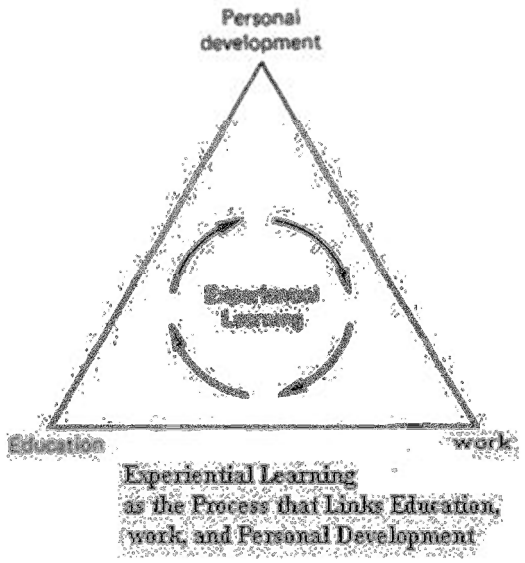
The second dimension describes the way in which people process the information. These strategies appear along a continuum between activity (active) and observation (reflective). These dimensions are combined to form four types of learning style: Concrete Experience, Reflective Observation, Abstract Conceptualization**,** and Active Experimentation**.** These learning styles emerge from the learning modes employed in the experiential learning cycle (Appendix 2.1, section on Experiential Learning on p.299). The following figure, Figure 2.3, provides a graphic representation of Kolb's theory:

Figure 2.3: A Graphic Representation of Kolb's Theory



Experience is knowledge captured during concrete experience. This knowledge represents what we know often before we understand. This is a learning activity that takes place 'during' work processes. It is important not to underestimate the value of experience. Kolb assesses experience as the main component of learning, controlled by the right brain hemisphere. And since our brain is apparently constructed of two complementary components, thus too insights are based both on conclusions and on experience. These two elements are mutually enriching; abstract conceptualised learning relies on past cases and is constructed on them. Concrete experience helps to validate the conclusions. In the opposite direction, recording and registering the experience includes elements of abstract conceptualisation. The combination of these two types of processes creates the synergy that enables the learner to correctly absorb the lessons, to integrate experience and to perform true learning (Kolb, 1984). The following figure, Figure 2.4 describes the process of experiential learning proposed by Kolb.

Figure 2.4: Experiential Learning according to Kolb



(Source: Kolb 1984, 5)

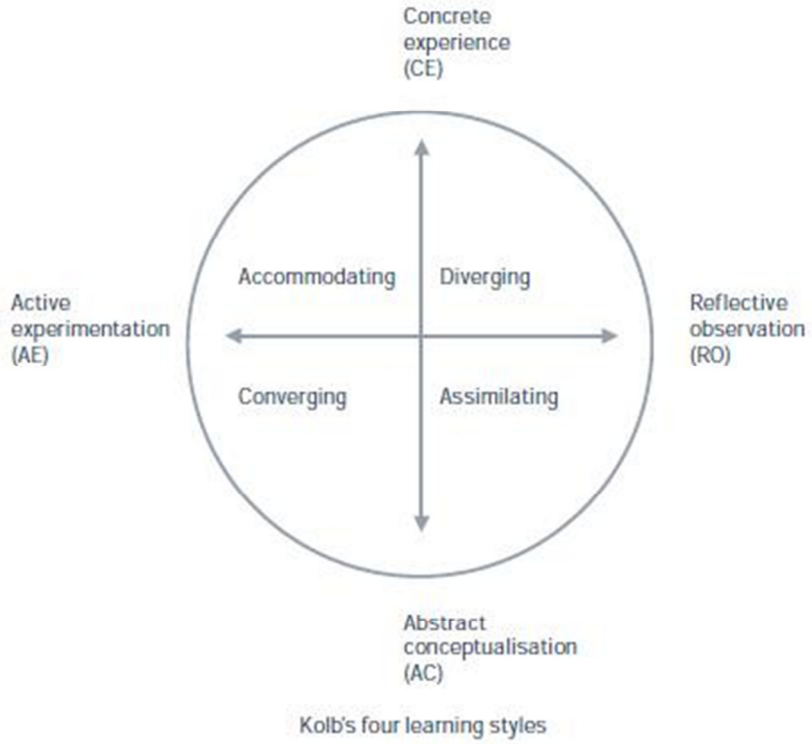
The learning types described according to this theory are:

- *Diverging*: this type combines reflective observation with concrete experience; these learners interpret practical experiences well from several different viewpoints. Their approach to situations leans more towards observation than taking a position and they are happy in situations that enable them a large space to create ideas, such as brainstorming. They prefer to study in groups, listening with an open mind, and receiving feedback from their environment. They have a propensity for the arts, entertainment and work in services.
- *Assimilating:* this type combines abstract conceptualisation and reflective observation. These learners are able to take large amounts of knowledge and to summarise them in order to form a logical structure. They prefer to deal with abstract ideas and concepts rather than with other people. They would prefer a theory to be logically stable rather than having a practical value. In their studies they prefer lectures, reading, and investigation of analytical models. These people can effectively undertake a scientific career and data processing.

- *Converging:* this type combines active experimentation and abstract conceptualisation. These learners know how to find practical solutions for theories and ideas; they are good at solving problems and prefer to deal with technological rather than sociological problems. Learners of this type learn better when they are performing experiments, simulations and laboratory work with new ideas, and promote practical applications. They can effectively undertake a technological career.
- *Accomodating*: this type combines active experimentation with concrete experience. This type of person learns best from active experimentation, is happy to perform new tasks with challenging experiments, and is motivated by feelings and information from people rather than logical analysis. These people learn from work with others in all areas and they can effectively undertake a career in commerce (Kolb & Kolb, 2005).

The model described by Kolb and Kolb (2005) has been in use since it was presented and has led to the development of other models such as Honey and Mumford's LSQ and McCarthy's 4MAT system. The following diagram Figure 2.5 presents a graphical presentation of the four learning types described above.

Figure 2.5: Kolb's Four Learning Styles



(Source: Coffield, et. al., 2004, p. 62)

According to Kolb's theory, pupils with different learning styles are expected to react in different ways to particular types of teaching methods. Thus Kolb recommended that the teaching method should be modified according to the pupil's learning style, since in his opinion, certain pupils certainly perceived abstract concepts differently from their friends, who needed the help of concrete images in order to learn. There is also evidence that learners with an abstract cognitive style gain more from an abstract model and are deterred by concrete models (Kolb, 1985). It has been suggested that even in online courses instructors should consider the difference in students' learning styles, and modify the learning materials and the amount of time allocated for students' reading of learning materials (Lu et al., 2007).

The Learning Style Inventory (LSI)

This inventory helps to identify the learning styles according to Kolb and describes the way in which people learn, and how people cope with ideas and daily situations. The basic assumption underlying the inventory is that every person learns in a different way and the inventory can constitute an incentive to explain and reflect the way in which people prefer to learn in a particular environment. According to Kolb learning can be described as a cycle composed of four basic processes (see Appendix 2.1: section on Experiential Learning), the LSI takes the individual through these four processes (Kolb, 1999). The Inventory includes 12 questions, each question provides 4 possible answers (see Section 2.2.1.1: on The Learning Style Inventory). Kolb (2000) even relates to the fact that the learning styles are associated with preferences for different professions and that people choose a career that is suitable for their learning style.

In 2005, an improved version of the LSI called KLSI3.1 was formed, which was enhanced by Kolb to include new norms established from the enormous experience that had accumulated from work with the basic Inventory (Kolb & Kolb, 2005). These norms were actually based on a larger, more diverse and more representative sample of 6,977 LSI users.

Kolb (2000) claims that teachers tend to prefer realistic experience. This finding is explained by Kolb by the fact that people usually tend to choose a career that is most appropriate to their learning style and also by the fact that people are shaped by the career that they choose to enter. If there is a lack of good fit between the career and the learning style, Kolb predicts that the individual will 'either change or leave this field' (ibid, p. 41).

In order to help people to choose a suitable career, Kolb presented the strengths and weaknesses of each learning style, together with the means for strengthening a style which might be insufficiently developed. Thus, for example, those who are good at assimilating separate distinctions into a logical explanation are said to be drawn to a career in the sciences: physics, biology and mathematics, and educational research, sociology, law and theology (Kolb, 2000).

Kolb claims that the assimilated skills can be enhanced by specialisation in: the organisation of information, construction of conceptual models and analysis of quantitative data.

No empirical data are offered to support these very detailed claims and there is no explanation of how, for example, someone with a diverging style who is interested in people and creativity can add the assimilating style to their repertoire if they are presented with a list of skills connected with this style and an invitation to specialise in these skills.

A report drawn up in Britain in 2004 notes that Kolb's LSI Inventory is well known and widely used and has also become accepted in the field of occupational and vocational counselling, however the report criticises the commercial profits reaped by the creators of the learning styles, which are so large that they have become impervious to criticism concerning their empirical and theoretical foundations (Coffield et al., 2004).

McCarthy's Model

McCarthy (1980) also relied on the work of Kolb and 18 other researchers who surmised that everyone has a dominant learning style but effective learning involves a combination of styles. This viewpoint is reflected in her model that combines the different learning styles. Her lessons were divided into four quarters and in each quarter a different teaching style was employed.

McCarthy proposed 'Learning around the Learning Cycle' according to the experiential process described by Kolb (Appendix 2.1: Experiential Learning) according to the '4MAT' system. When a preference for feeling or thinking is combined with a preference for observation or practice, four clear combinations of preference are formed. These four combinations compose the 4MAT.

The 4MAT system was designed to help the classroom teacher to improve teaching by employing eight strategies as part of the learning cycle; the underlying assumption being that there are four main learning styles, as follows:

- Learners with imagination who want to know 'why?' This type of learner enjoys listening, talking, interaction and brain storming.

- Analytical learners learn by asking 'what?' They find it most comfortable to observe, analyse and categorise and to construct theories.
- Logical learners want to know 'how?' in order to implement new learning. They are happiest when they are experimenting, influencing, improving and restoring things.
- Dynamic learners are those who ask 'what if?' They enjoy correcting, modifying, taking risks and creating.

McCarthy (1990) composed eight steps to meet the needs of these different learners and offered a choice of various techniques for right and left brain processing for all four stages of the learning cycle. Thus, it became possible to employ the style of learning that was most comfortable for a particular pupil when it was their turn and to train the pupil to act in situations that were less comfortable when a non-preferred style was employed. According to Coffield et al. (2004) the claim that this process corresponds to a natural learning cycle has not yet been proved.

McCarthy (1990) sees the use of the method as an impetus for change, since teachers who begin to use this method become 'agents of change'. Firstly, teachers alter their approach towards differentiation among the pupils and see it as a means to improve learning for all types of pupils and not only for the analytical pupils who thrive in traditional classes. Teachers then begin to recognise that education involves more than just the transfer of knowledge and they begin to use more dialogue and fewer monologues. Eventually, teachers start to talk more with their colleagues about their teaching and begin to train and guide each other.

The initiation of change is effected through three steps:

First step: active experience.

Second step: analysing the pupils' active experience by considering the feelings aroused during their experience, understanding what is relevant for them and what is not, trying to summarise the experience in writing and by sharing it with other members of a group.

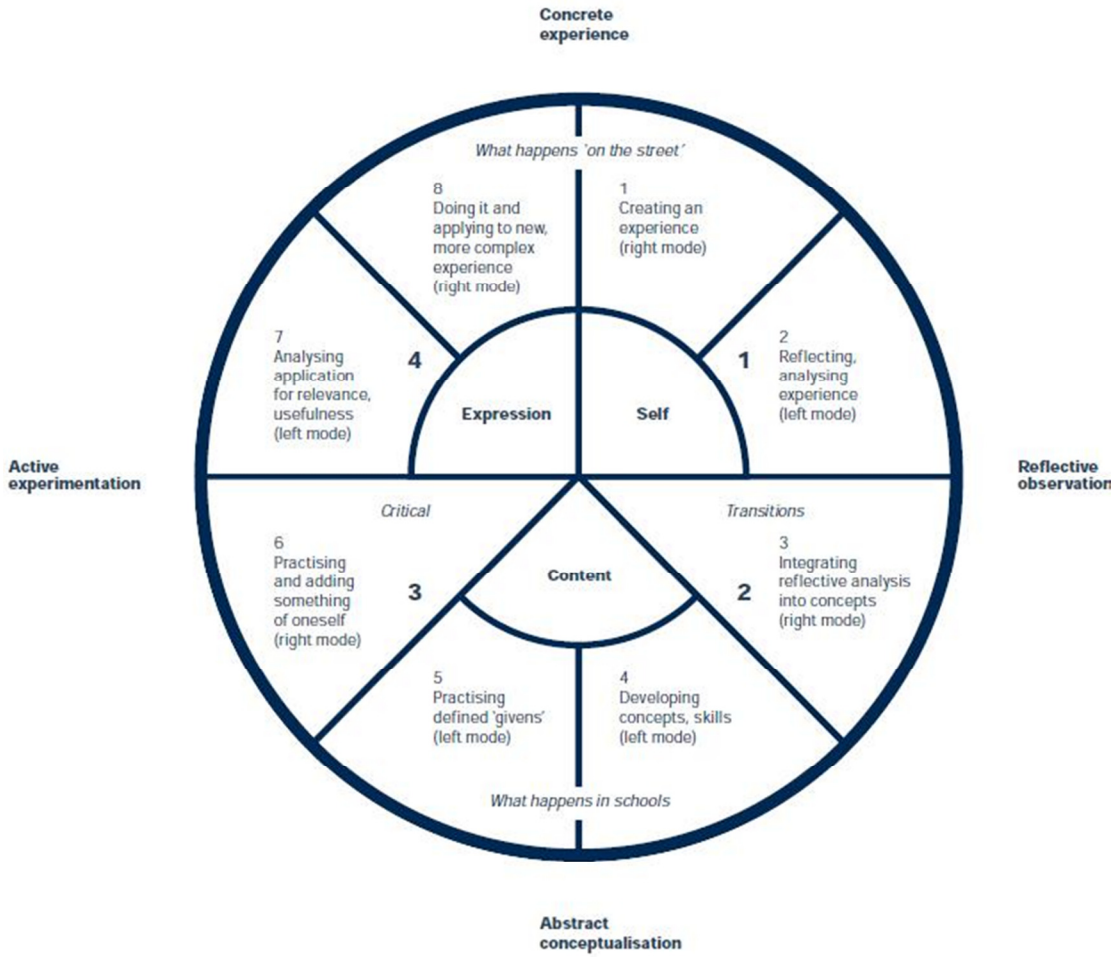
Third step – to create a Visual representation of the events such as a diagram or flow chart.

To conclude: the products are brought to the group and the group discusses their common and different properties (Blackwell & McCarthy, 2007).

In a study conducted in the upper classes of a school that used the 4MAT system, it was found that use of the model strengthened pupils' memory and was especially effective for the enhancement of their long-term memory for all levels of pupils (Lee & Hung, 2009). In another study in a secondary school that used the 4MAT system for mathematics, it was found that the system was more effective than another system used in a control class (Tatar & Dikici, 2009).

Figure 2.6 below shows a graphic representation of the 4MAT system as it is employed in the learning cycle.

Figure 2.6: 4MAT System (McCarthy, 1980)



Like McCarthy (1980), Honey and Mumford (1984), based their work on the concepts of Kolb. Their 'LSQ Questionnaire' is applied to categorise learners primarily in work places. They reasoned that learners can improve their achievements when they know and understand their own learning style. Similarly, Honey and Mumford (2000) aimed to respond to the needs of managers and trainees aspiring to improve employee staff learning through the different learning styles. Their work is less relevant to learners in schools although some of their principles can be applied to the education system (Honey and Mumford's *Learning Styles Helper's Guide*, 2000).

Vermunt (1996) related to learning styles and approaches in higher education and added a quantitative instrument: the Inventory of Learning Styles (ILS) to measure components of the students' learning styles.

In 1976, Joseph Hill related to the cultural and socio-economic facets of learning styles. Relying on similar principles to those of Kolb, Joseph Hill defined a learning style as the special way in which a person seeks for meaning, indicating that cognitive processes are influenced by the culture of a person's parental home and social status (Wintergerst et al., 2003).Hill's index (1976) was known as The Cognitive Style Interest Inventory.

Fischer & Fischer (1979), considered the learning styles of school pupils. They indicated that it is important to match the teacher's teaching style to the pupils' needs (i.e. learning styles). Like Kolb (1983) they based their conclusions concerning learning styles on observations and direct experiences that they enriched with their productive discussions with sensitive and capable teachers. They identified the following learning styles:

- The accumulative learner – progressing step by step and constructing knowledge.
- The intuitive learner – does not follow any ordered sequence.
- The learner with a specific sense – relying especially on a particular sense.

Reisman (1966) claimed that learning styles were determined from birth, Reisman especially noted that learners should be helped to reveal their learning style in order to help them to channel themselves into an appropriate learning method in

which they can improve their learning. Riesman therefore attempted to exploit knowledge on learning styles to empower learning in schools.

Professor Rita Dunn was asked by the New York State Department of Education to help to design a programme that would improve educators' (mentors, parents, and teachers) effectiveness for pupils who failed to exhibit appropriate progress. Together with Professor Kenneth Dunn, she developed the Dunn Learning Styles Model (Dunn & Dunn, 1972, 1993). This tool identified 20 elements that together described the learning environment and approaches that the individual student takes when learning, relating to the learners' environmental, emotional, sociological, physical and psychological reactions.

In 1978, Dunn and Dunn improved their model (see details: Section 2.2.2.2 below). The revised model takes account of stimuli that encourage pupils' effective learning and stimuli that impede this process. The stimuli identified include environmental, emotional, sociological, physical and psychological stimuli. Each characteristic is described in the minutest detail to allow learning phenomena to be explained accurately. This model (Dunn & Dunn, 1978) has been widely applied and over a period of 37 years, 450 different studies have been undertaken concerning the model which has been translated into many different languages (Rundle, 2009).

Inter alia Dunn and Dunn deal with the absorption of subject matter through the senses. This perception was echoed by Barbe and Swassing (1979) who found that learning was effective when it was absorbed through the individual's preferred perception – Visual, Auditory or Kinaesthetic perception. To express this theory they developed an index known as the Swassing Barbe Modality Index that assesses the person's preferred modality (Visual, Auditory or Kinaesthetic), relating especially to the ability of educators to adapt the learning environment to the pupils' preferences (Barbe & Swassing, 1979).

Butler (1984) attempted to adapt her teaching to the learning styles of her pupils. Butler developed a model of *'Teaching according to Styles'*, drawing from Blum's taxonomy and Gregorc's model. This new model contributed to classroom practices with regard to the adaptation of lessons to the pupils' learning styles.

Hunt (1986) developed Conceptual Level Theory, claiming that it was insufficient to relate solely to a learning style and it was also necessary to consider the learner's conceptual level, in other words the learner's ability to understand abstract concepts. If the learner has a low conceptual level, the teacher should use more structuring (paintings, graphics) and vice-versa.

In 1988, Felder and Silverman published a four dimensional learning styles model, in which each dimension represented two types of learner (see a detailed description in Section 2.2.2.1 below).

The four dimensions were:

- active/reflective – relating to preferred procedures of data-processing
- sensing/intuitive –relating to the learner's orientation
- Visual/verbal – relating to the manner by which the learner progresses towards understanding
- sequential/global– relating to the preferred manner of presentation or absorption

In 2002, Felder and Silverman expanded their theory since they found that each person combines different learning styles, although each has a dominant style. Nevertheless none of the styles was significantly distinguished.

2.2.1.2 Other factors affecting learning

Gardner (1993) contributed further to knowledge in this field when he indicated that everyone has seven distinct areas of intelligence: linguistic, logical-mathematical, musical, physical, Kinaesthetic, spatial and social-interpersonal. Gardner understood that each person has different abilities in each area so that it is impossible to relate to intelligence without considering all seven of these areas. Gardner's basic assumption was that it is possible to foster the different areas of intelligence, if the pupil is offered opportunities to experiment with the application of these areas in appropriate activities in and outside the school.

Vermunt (1998) suggested that attention should not only be directed to individual learning differences but also to the teaching/ learning environment. He understood that in order to improve learning the entire learning environment would need to change and not just the learning preferences of individuals, so that teachers would

encourage pupils to take more responsibility for content, process and results of their learning. A study of learning patterns over a period of 60 years (Tendy & Geiser, 1998-1999) found that most people learn in the same way that their parents did.

The learning style categorisation of Riding and Rayner (1998) related to cognitive processing rather than sensory absorption (see Section 2.3: Cognition). They defined the cognitive learning style as the way in which a person thinks, relating to the preferred and habitual approach used by a person to organise and represent information. Riding also constructed the Cognitive Styles Analysis (CSA) enabling the identification of people's cognitive styles in order to help learners process learning materials more easily.

Anthony Grasha and Sheryl Riechmann developed a tool known as the Student Learning Styles Scale (GRSLSS) in order to measure the learning styles of college students and upper secondary school pupils, and how these preferences are expressed in social interactions. This scale identifies the following main types of learner:

Competitive Learner: competes with the other pupils in the class in order to prove excellence. Motivation is external and driven by the need to be better than others.

Co-operative Learner: learns by sharing ideas with others and enjoys co-operating with both the teacher and other pupils.

Avoidant Learner: is not enthused about attending class or acquiring class content. These learners are typically uninterested in what is going on in class. Components of this style are fear of failure, and anxiety regarding negative assessment by others and these pupils sense that they lack talent, skills and knowledge.

Participant learner: enjoys studies and finds any learning situation interesting. Allocates time for and participates in all learning situations, conferences and meetings.

Dependent learner: needs approval by the instructor or another authority in order to perform things. Needs to receive the answers to problems and is less interested in formulating the answers independently.

Independent learners: have a strong need to learn independently and not to rely on the teacher's answers. Learn beyond what is requested.

Grasha (1996) also developed a tool to describe teaching styles in higher education institutes. He defines a teaching style as a pattern of needs, beliefs and behaviours expressed by teachers in the classroom. He identified five styles that represent typical orientations and strategies of the college teachers: expert, formal authority, personal model, facilitator and delegator.

Grasha claims that all the teaching styles can be found in each teacher to different extents. He found that the same teacher combined different styles, in some cases one style would be dominant (primary), for example: expert combined with formal authority or personal examples, or the teacher might use a combination of less dominant (secondary) styles. These combinations of styles form clusters that reflect the way in which the teacher designs the learning environment.

The Grasha-Reichmann model of learning styles (Grasha, 1996) differs from the other models described above, since it is based on the pupils' reactions to social situations in the classroom.

Richardson (1984) was aware of the problematic nature of learning in secondary school classes, when there is a lack of congruence between the teaching styles employed and the learning styles of most of the pupils. He found that middle and secondary school pupils mostly use a Visual learning style while their teachers use verbal methods and the information is given audibly through lectures or Visually in representations based on words and numbers. Since these representations include both Visual and Auditory stimuli they enable teachers to overcome inappropriateness of the teaching method and amplify the learning of all pupils.

In contrast, Willingham believed that although there are differences between pupils, in terms of learning there is more similarity than difference between the pupils, and familiarity with their learning styles is not essential. Decisions must be made concerning the teaching style, which are derived from the lesson content. For example if experimentation is necessary in science lessons, experiments should be conducted due to the knowledge construct of the discipline and there is no point in showing films (Willingham, 2010).

Bloomer and Hodkinson (2000) stress that it is important to consider the learner's socio-psychological aspects, although learning styles exist; they only constitute one of the factors involved in the learning process.

There have been many attempts to coordinate the different learning style theories and typologies. In 1983, Curry discerned that the term 'learning styles' was used to describe different phenomena, it was sometimes used to describe the way a person absorbs information (through sight, hearing or Kinaesthetic sensing) and sometimes to relate to the individual's way of processing information (remembering, etc.) and there were therefore difficulties in the application of this term. He created Curry's Onion Model which provided a schematic framework of all the different models of learning styles. This model, like an onion, has different layers, internal, intermediary and outer. Each specifically defined layer contains several models of learning style that correspond to the layer's definition.

- The outer layer of Curry's model relates to educational preferences. This layer has a low level of stability and is easiest to influence. Influences include: learning environments, learner expectations, teacher expectations and other external characteristics. The model of Dunn and Dunn is included in this layer (Curry, 1983).
- The intermediate layer relates to the intellectual approach used by the individual to assimilate information. This layer is considered more stable than the outer layer, since it does not deal directly with the environment, although it can be modified by learning strategies. For example Kolb's theory (1984) and McCarthy's 4MAT system (McCarthy, 1997) are included in this layer.
- The innermost layer of the model relates to an examination of the individual's cognitive style, that guides the individual in the appropriate direction and implements the information absorbed (Curry, 1983).

Researchers have continued to show an interest in the learning style models in the last four years, nevertheless as already noted, there are some scholars who claim that 'learning styles' is not the only factor that influences the pupils' achievements and their motivation. Lichtinger (2010) claimed that the extent of relevancy of the learning task, the characteristics of the task and the pupil's feelings towards the

teacher influence their motivation. Wilson (2010) criticised the emphasis given to learning styles and claimed that the only thing that was important in learning styles was the fact that awareness of their learning styles improves the learner's self-awareness.

2.2.1.3 Summary

Learning styles are explained by some researchers as a genetic tendency (Reisman, 1966; Tendy & Geiser, 1998, 1999) while others identify them as a cultural product (Hill, 1976) or claim that they are derived from individual responses to social situations (Grasha, 1996). Several researchers relate to the need for a combination of teaching styles in the classroom (McCarthy, 1980; Kolb, 1983; Richardson, 1984) to accommodate pupils with different learning styles while yet others claim that the teacher's teaching style should be adapted to the individual learner's learning style (Fisher & Fisher, 1979; Dunn & Dunn, 1990).

Research has investigated attempts to improve learning in light of knowledge concerning learning styles, examining the relationship between teaching strategies and the learners' different learning styles (Gagne, 1967). However, with advances in technology and their implementation in education, research concerning learning styles has begun to explore the relations between learning styles and the implementation of technology in education, from multimedia (Baturay et al., 2010) to computerised and on-line lessons and distance teaching, blogs and Internet discourse. It is however obvious that research concerning learning styles continues to influence educational practice until the present (Pitta-Pantazi & Christou, 2009; Baturay, et al., 2011).

In the context of on-line learning, Ozpolat and Azar (2009) developed an on-line model that provides a selection system to identify the learning style of any learner who copes with computerised contents and learning. The learner is initially required to answer several questions and according to these responses the digital system identifies the learner's learning style. At the second stage, the system is supposed to automatically adapt the on-line learning programme to correspond with the learner's characteristic learning style. The selection and identification of the learning styles is based on the Felder-Silverman learning style categorisation.

The next section deals more widely with selected learning style models deemed relevant to the present research.

2.2.2 Learning style models employed in present research

As was seen from the above review, recent decades have witnessed the construction of various models of learning styles. Common to them all is the conceptualisation of the differences between different students, and the argument that within the teaching framework learning materials should be presented in alternative ways to enable students to improve their achievements. Nevertheless the different learning style models highlight different concepts.

In 2004, a comprehensive review published in Britain by several researchers (Coffield et al., 2004) found 71 models of learning styles. This proliferation of model and theories made it necessary for the researcher to decide which types of theories would most suit the research goals and be most appropriate to serve as the conceptual foundation in order to answer the research questions. The researcher decided that theories of learning styles that related to sensory perception (see Section 2.2.1 Development of Learning Styles) and absorption of knowledge (Barbe et al., 1979; Dunn & Dunn, 1979b, 2005; Felder et al., 1988, Felder & Spurling, 2005) would be most appropriate for these purposes, since they related directly to the pupils' different learning processes in the classroom. She chose to focus on the VARK categorisation (Visual, Auditory, Reading/writing and Kinaesthetic) of learning styles, assuming that she could construct special lessons that would include elements of all these styles allow her to examine the responses of pupils with different diagnosed learning styles to these specially constructed lessons. This would enable her to discover whether the combination of the different styles in the lessons would hinder or assist the pupil's learning (absorption, memorization and assimilation of the subject matter) according to their different learning styles, and whether particular elements of the combined styles would hinder or assist pupils with different learning styles.

This section explains three models of learning styles which were found most relevant to the present study, both of them models that relate to sensory perception (other models appear above in Section 2.2.1). Within the models

discussed here, special attention is given to Visual, Auditory, Reading/writing and Kinaesthetic learning styles.

2.2.2.1 The Felder and Silverman Model (1988)

Felder and Silverman combined dimensions from several other models (Herrman 1990; Kolb 1984; Lawrence 1994) to form a model of learning styles based on four dimensions:

- preferred data-processing procedures
- the learner's orientation
- the way in which the individual progresses towards understanding
- the preferred manner of presentation or absorption. In relation to this dimension the researcher related to Visual/Verbal elements (Felder, 2002) which resembled the learning styles (Visual – Auditory – Reading/writing) that the researcher wished to investigate in the present study.

And each of these dimensions is represented by two pairs of learning types:

- active/reflective – sensing/intuitive
- sequential/global - Visual/verbal

The Active/reflective Learning Type: relates to preferred data-processing procedures and is represented by two types of learner: active learners and reflective learners. Active learners learn to understand and retain information through active experience of the studied subject, through discussion, application or explanation of the subject to others. They prefer group work. Reflective learners initially prefer to think quietly about the subject and only later to experience it and they prefer to work alone. Learners of these two types usually find it difficult to listen to lectures and they need practical and physical action in order to learn.

Felder and Silverman's active/reflective categorisation resembles the Kinaesthetic learner described in the model of Dunn and Dunn (see Section 2.2.2.2 below) or in the VARK test of Fleming and Mills (1992) (see Section3.7.2 Pre-Research Preparations - Introduction) and relates to*:*

The Sensing/Intuitive Type:. Sensing learners have a practical orientation regarding facts and processes, and also in relation to the world of reality. Intuitive learners have an orientation towards theories and meanings. Sensing learners tend to process and retain information by learning and memorising details. They tend to have patience for details and feel confident when they solve problems with structured well-known methods. Intuitive learners tend to employ abstract thinking. They process and retain knowledge through investigation and discovery. They prefer to reveal the connections between new facts by themselves. In the main they despise memorization and routine thinking. In general sensing learners tend to be practical and cautious, while intuitive learners tend to invent, innovate and work swiftly.

Sequential/ Global Types: This learning type relates to the way in which learners progress towards understanding. Sequential and global learners both see the complete picture at the end of the process, but the way that they progress towards understanding differs. Sequential learners tend to develop understanding linearly, sequentially and logically. In contrast, global learners learn in leaps, they cannot understand the sequence from the beginning of their learning of a subject, but instead absorb it in a random manner.

The Visual/Verbal Type: This learning type relates to the preferred manner of presentation or absorption.

- Visual learners learn and remember better when information is presented to them Visually, in pictures, diagrams and films, and this resembles the Visual style in the model of Dunn and Dunn and in Fleming's and Mills(1992) VARK model. It is however noted that with regard to diagrams Kefach (1997) found that comprehension of flowcharts requires different cognitive skills, and a high level of abstraction in order to transfer from graphic representation to verbal representation, it is therefore important to take the cognitive level of the investigated population into consideration when using flowcharts.
- The verbal learner absorbs information better when it is presented in verbal form, in lectures and verbal explanations. This learner corresponds with the Auditory learner described in the model of Dunn and Dunn and the Aural (Auditory) learner in the VARK Test of Fleming and Mills (1992).

Felder and Silverman (1988) emphasise that every learner has their own preferred style, and from the point of view of values no style is either positive or negative. The model relates directly to different learning styles, aiming to help different learners to learn effectively in order to progress to the achievement of their goals. Felder (2002) claims that for the Visual type, a word, even though it is sketched and written, is not a Visual element. With regard to Visual learners, a picture is really worth more than a thousand words (either spoken or written). Felder therefore re-categorised the learning styles. One of the categories was the Visual/Verbal in which those who write and speak are included within the same category which is known as the Verbal category, while in the VARK test of Fleming's and Mills (1992) the division is different, being divided into Visual and Reading/writing styles. In the opinion of Felder (2002) a learner who prefers Visual perception, will feel more comfortable if the teacher uses more diagrams, pictures, films etc.

The present study considers the participants' preferred way of receiving or absorbing information, what the authors of the model call the *Visual/Verbal* type, to which is added the *Active/Reflective* type who need activity in order to learn, this characterises learners that Dunn (2000) and Fleming (1995) calls the 'Kinaesthetic' style learners.

The model of Felder and Silverman may provide a better categorisation of learners than other typologies. The report by Coffield et al. (2004) found that it serves a good cross-section of learners. They felt that the categorisation was satisfactory; however they note that no empirical research has yet affirmed the model of Felder and Silverman. Based on the Felder-Silverman model, Felder and Solomon developed a questionnaire known as the *Index of Learning Styles* (ILS). Felder and Spurlin validated the use of the ILS through a review of hundreds of studies conducted regarding the ISL in universities throughout the world; they concluded that: '*as long as the Index of Learning Styles is used to help instructors achieve balanced course instruction and to help students understand their learning strengths and areas for improvement (as opposed to being used to predict students' grades or deictate their course or curriculum choices), our analyses and other published analyses suggest that the current version of the instrument may be considered reliable, valid and suitable*' (Felder & Spurlin, 2005, p.111).

Felder and Spurlin thus confirm the determination of Van Zwanenberg et al. (2000) that it is preferable to use the ILS in order to enable an individual to compare the advantages of their relative learning preferences and not to use it to predict academic performances. Since learning styles reflect personal preferences and inclinations, it is impossible to indicate advantages and disadvantages of a particular style. According to its creators, the function of the ILS is therefore to help teachers to know their pupils' learning styles better and to prepare their lesson to assist pupils' learning according to this knowledge, also to raise the pupils' awareness concerning their learning styles, since such awareness can itself improved their learning (Wilson, 2010), the ILS is valid and reliable for these two applications (Felder & Spurlin, 2005).

In 2002, Felder extended his theory and suggested that everyone combines different learning styles, yet each one has a more dominant style, although no style is significantly distinguished. Fleming (1995) also made these assumptions and his VARK test enables the diagnosis of combined elements of learning styles (the multi-element style) (see Section 3.7.2).

In Felder's opinion, there are three categories of ways in which people receive information:

- *Visual* –stimulation of the Visual sense relating to the absorption of information from symbols, pictures, diagrams and pictorial animation and colours, used also in flowcharts, timelines, explanatory films etc.
- *Auditory* – stimulation of the Auditory sense, dealing with the absorption of sounds and words, emphasising that these types find it easier to absorb learning by listening and then talking about it, in discussions or conversations. This is parallel to the Aural/ Auditory style mentioned by Dunn and Dunn and by Fleming.
- *Kinaesthetic* – stimulation of the sense of touch expressed in movement, taste, touch and smell (Felder, 2002). This resembles the Kinaesthetic style mentioned by Dunn and Dunn and also by Fleming.

This typology is directly parallel to three of the elements of the models described by Dunn and Dunn and Fleming (V, A and K).

Felder (2002) notes "*that pupils retain 10% of what they read, 26% of what they hear, 30% of what they see and hear. 70% say, 90% say and do"* (p. 677). He also deals with the issue of which techniques are appropriate for teaching the different learning styles, suggesting that motivation should be improved as much as possible, and learning material should be organised in such a way that it is clear what comes after what. In Felder's opinion each learning style should be addressed during the lesson for example as follows: **Visual** – the teacher use pictures, graphs and video-tapes during and after the **verbal** presentation of learning materials. The teacher should provide something as an example and something that needs to be constructed for **active le**arners.

Felder (2002) talks about the need to combine these different teaching styles. The present research adopted this approach, by creating special lessons which combined all four learning styles and then examining the pupils' responses to this combination of teaching styles according to their personal learning styles. Felder also suggests that the teacher should speak with pupils about their learning styles in counselling and in the classroom. The pupils can regain their confidence when they understand that their academic difficulties are not all personal disabilities. This part of Felder's theory was not examined in this research, although the researcher explained the pupils' diagnosed learning styles to them before the research began.

Both Felder and Silverman, like Dunn and Dunn and Fleming, have Internet sites for example: http://www4.ncsu.edu/unity/lockers/users/f/felder/public/ILSpage.html, that publicise their models. The ILS of Felder and Soloman is continually being researched and employed throughout the world. For example the recent examination of the reliability and validity of the ILS in the Greek language in comparison with Kolb's Inventory (Platsidou & Metallidou, 2009; see also Section 2.2.1) or the examination of the ILS Chinese version (Ku& Shen, 2009).

2.2.2.2 Dunn and Dunn: Learning styles model

Already, in 1960, Rita and Kenneth Dunn had begun to apply their research to learning styles (Dunn, 2004). The model suggested by Rita and Kenneth Dunn is widely used both in the USA and many other countries. Formed on the basis of their research and practical work in schools, it is represented on Internet sites and

annual conferences discuss its use. The model includes 21 items that in their opinion actively influence the individual's learning (see Table 2.1 below).

These items are divided into 5 categories: Environmental, Emotional, Sociological, Physiological and Psychological (cognitive processing).

Table 2.1 - Dunn and Dunn's Learning Style Elements

Environmental Stimuli Preferences	Sound Preference Light Preference Temperature Preference Design Preference (environmental organization)
Emotional Stimuli Preferences	Motivation Preference Persistence Preference Responsibility Preference Structure Preference (These characteristics typify people who prefer to finish one project and then go on to the next as opposed to people who work simultaneously on several projects)
Sociological Stimuli Preferences	This category relates to the way in which the learner interacts with others: Self-Preference Pair Preference Peers/Team Preference Adult Preference Routine or Varied Preference
Physiological Stimuli Preferences	Perceptual Preference (Auditory, Visual, tactual and Kinaesthetic) Intake Preference (the need to eat while learning) Time Preference (the time when energy is at a maximum, the best time for learning: morning, evening) Mobility Preference (the need to move while learning)
Psychological Stimuli Preferences	This element relates to processes of the two brain hemispheres' functions. The 'impulsive' aspect relates to the fact that there are people who act before they think as opposed to others who examine matters in depth before acting. Global/Analytic Style Hemisphericity Preferences Impulsive/Reflective Preferences

The perceptual elements shown in Table 2.1 above are elements employed in the present research with the exception of the Tactual element identified by Dunn and Dunn, while Fleming identified the Reading/writing element, an element which does not exist in Felder's model. Those with a Tactual style tend to prefer to use writing of remarks, a combination of reading with construction/formation/use of play, the electronic board, use of the mouse on the computer and a robotic portable computerised keyboard and i-pods (Dunn & Dunn website, 2011).

Additionally, Dunn and Dunn relate to the time in which the learner's energy level is maximised, the need for nutrition while learning, movement during learning, optimal learning time (morning, evening) – this part of the model was not considered in the present research.

The Dunn and Dunn model has been widely publicised in all continents especially through their Internet site that publicises their books and articles and through their annual conferences and this commercialisation has been criticised in a stern report by Coffield et al. (2004). Rita Dunn (2004) provided a strong response to this criticism, answering 9 points raised by Coffield et al. (ibid), including the issue of the validity and reliability of the VARK tests, citing hundreds of professional articles and doctoral theses from many countries on these issues. She concludes that those who wrote the report had no authority to criticise the model since *'the report that I received is so lacking in fidelity to any standard of principle, professionalism or propriety (and includes so many biased interjections) that I lack faith in the Project Team's objectivity and scholarship*' (International Learning Style Network, 2004, p 33).

The following table, Table 2.2 shows the actions conducted by a person that define their learning style. For example a pupil who likes to listen to music and also learns better in lectures can be classified as using an Auditory learning style.

Table 2.2: Characteristic Activities of different Learning Styles

Auditory	Visual	Tactile	Kinaesthetic
Listening Lecture Discussion Recording	Reading Print Diagrams Close eyes to recall	Use their hands Underline Take notes	Whole body movement Real-life experiences/ visiting Total involvement Acting/drama/puppetry Building/designing Interviewing Playing

The following diagram, Figure 2.7 illustrates the five categories of Dunn (2000) and the elements that belong to each category. In the present research, the researcher related to the perceptual elements in the psychological category

Figure 2.7: Dunn and Dunn's Learning Style Model

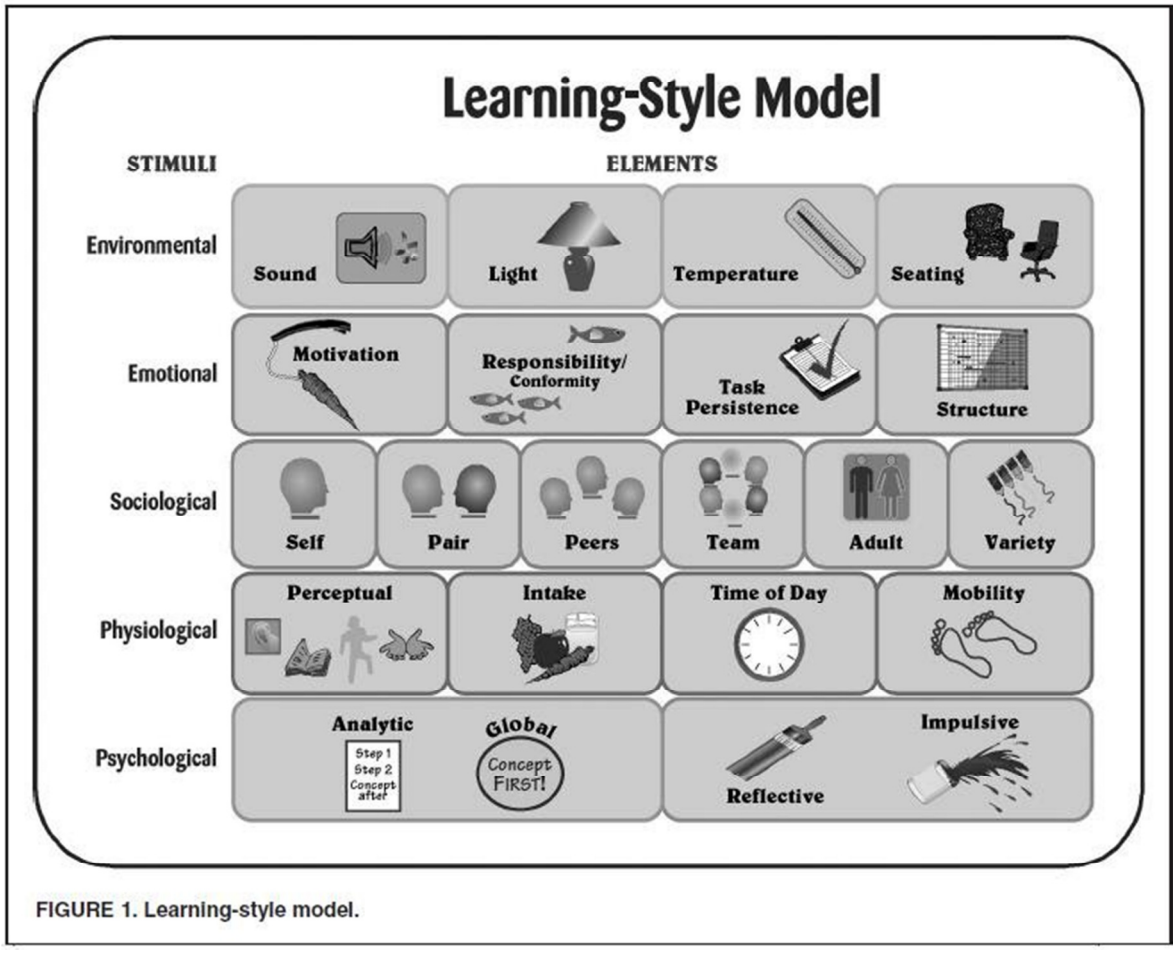


FIGURE 1. Learning-style model.

2.2.2.3 Miles and Fleming: Learning Styles Model

The present research distinguished learning styles according to the model of Miles and Fleming. The term 'style' refers to the preferred way in which a person:

1. Absorbs information (intake)
2. Processes and analyses the information absorbed (SWOT – Study Without Tears)
3. Expressed the knowledge through his/ her thoughts and conclusions (output)

This conceptualisation is represented in the following flowchart.

Figure 2.8: Intake-Output Model of Miles and Fleming

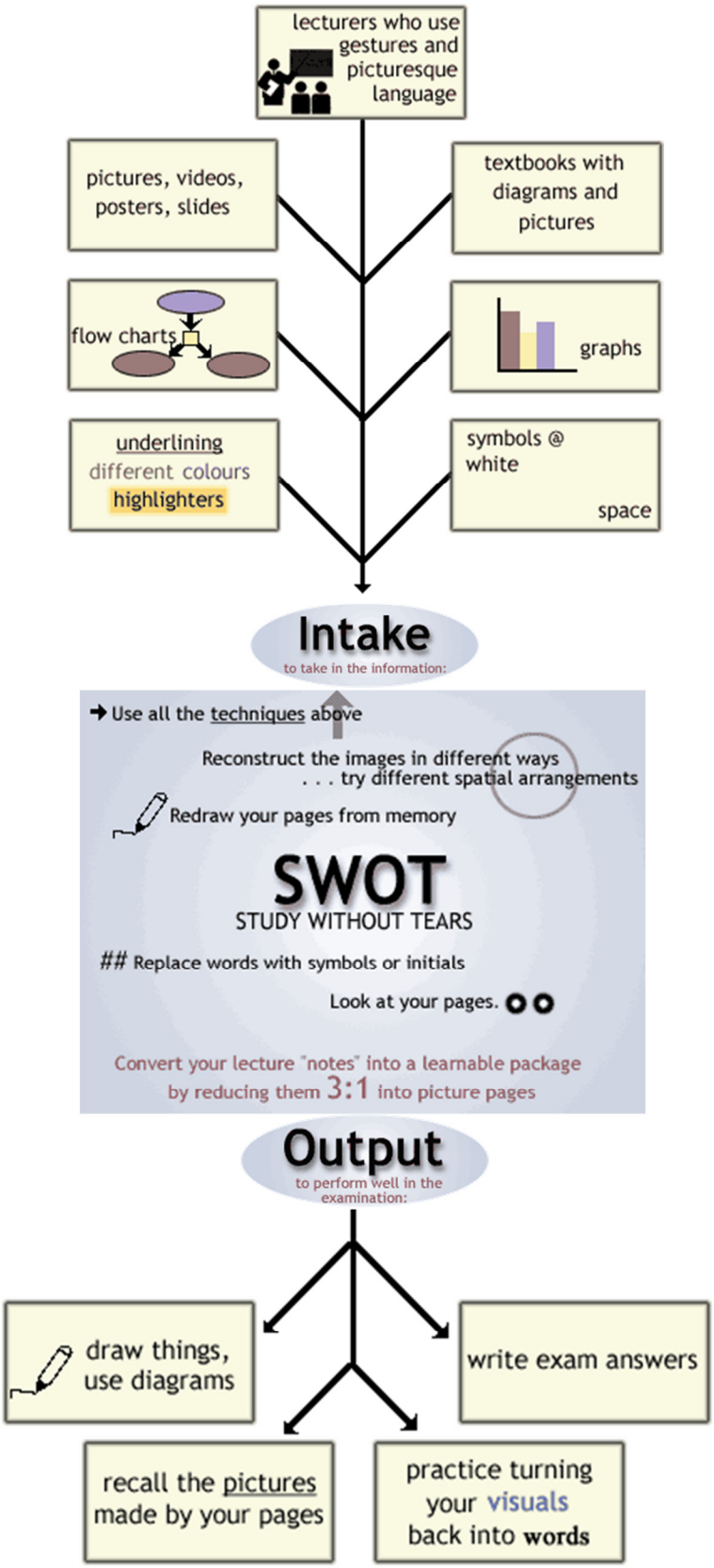
The research related to four main learning styles and four main teaching styles described by Miles and Fleming:

- Visual Style
- Aural (Auditory) Style
- Reading/writing Style
- Kinaesthetic Style

The Visual Style

Individuals diagnosed as having a Visual style, absorb information optimally when the subject matter is presented in the form of pictures, diagrams, pictorial animations, graphs, symbols, video, flowcharts and underlining. They will also prefer to express their knowledge and throughts in similar ways such as drawing, use of diagrams, pictures, and Visual descriptions and will often use descriptive examples in their answers as detailed in the following flowchart. They usually have a holistic perception and are mainly influenced by observation of objects, colours, and design

Figure 2.9: Intake and Output of the Visual Style Learner



Source: http://www.vark-learn.com/english/page.asp?p=Visual

Aural (auditory) style

Individuals diagnosed as having an Aural (Auditory) style absorb subject matter optimally when they listen to lectures, discuss and debate issues with friends and teachers. They explain their ideas and thoughts vocally and prefer to use a tape recorder. They often remember interesting details from stories and reports that they have heard. Even Visual matters are preferred with oral explanations and descriptions. They prefer to process subject matter through discussion with others, recording summaries and listening to them or reading them out loud. These learners prefer to express their knowledge orally in front of an audience that listens to them or to imagine that they are talking to the examiner and to explain their answers orally.

Reading/writing Style

Individuals diagnosed as having a Reading/writing style absorbs subject matter optimally when they make lists and summarise the information, registering definitions and titles and sometimes copying information word for word, drafting compositions with the assistance of dictionaries, summarizing material in lists and notes. These individuals process the subject matter by reading and re-reading the information repetitively and translate graphs and sketches into words and summarise them in writing. They express their knowledge and thoughts in full written answers and prefer to write paragraphs and lists and to organize words in a hierarchy of points for consideration. They believe that the written word provides a meaningful picture and prefer to express themselves in writing and read a lot. They will always prefer to read and write about a subject instead of discussing or arguing about it.

Kinaesthetic style

Individuals diagnosed as having a Kinaesthetic style absorb subject matter optimally when they activate all their senses and especially love to learn through touch, constructing models and working in laboratories. They enjoy experiencing things, learning from trips, experiments, exemplification of rules and situations, practical experience, all sorts of collections and also enjoy deconstructing and constructing models. They process subject matter by changing written matter into concrete matter, using many examples in order to understand the subject matter and recalls things from memory with actual practical cases that express abstract

ideas. They like to cooperate with other people with a Kinaesthetic style to remembering experiments and trips and this helps them to assimilate the subject matter. True and concrete things help them to remember the contents. They express their knowledge and thoughts by constructing models, performing experiements, creating presentations, preparing collections and all other sorts of concrete activity. They need to do things in order to understand them.

Note: 60% of the people who took the VARK test on the Miles and Fleming site were found to have multiple preferences (multi-modal style), as for example AV (Aural and Visual) or ARK (Aural and Reading/writing and Kinaesthetic).Even those diagnosed with a single element may use other elements although the diagnosed element is the preferred element (see Fleming, 2001, Internet site: http://www.vark-learn.com/english/page_content/multimodality.htm). Throughout the present research the researcher used the terms 'learning style' and 'teaching style' in line with the theory explained in this section and the pupils' learing styles were diagnosed with the help of the VARK test (see Section 3.7.2).

2.2.3 The application of learning styles in teaching

When discussing the 'use of learning styles in teaching', it is useful to look at the entire complex known as 'teacher training' as it relates to learning styles. Learning is a complex process, through which the pupils alter their understandings that they had previously internalised concerning the way in which the world works. New information either alters or confirms their beliefs. Teaching cannot be divorced from the learning environment that is composed of multiple factors: teachers, learning contents, the studied issue, the teaching methodology, the pupils' motivation and willingness to develop, and the development of technology (Brooks & Brooks, 1999; Rose 2008; Rose & Meyer 2006; Dede 2009; Cook, 2010).

Is it possible to isolate the human factor: the teacher or the pupil? Is it possible to look at the teacher's teaching and make suggestions for change? Or to observe the pupil as a separate entity? In the researcher's experienced opinion, it is impossible to isolate the characteristics of the humans who act from the learning process, and teaching should be discussed in the context of learning styles.

It has been shown that when the pupils know what their learning style is, they can improve their learning, and they can learn to use their learning style as a tool, that enables them to process the learning and to understand the material better (Fisher & Fisher, 1979; Brandt, 1990; Kolb, 1999; Baykan & Nacaz, 2007; Rogers, 2009; Wilson 2010). Observation of the learning process in the class itself indicates that most pupils can learn, but since each pupil focuses, processes, absorbs and remembers difficult new information in a different way, the teaching style should be suited to the individual pupil's needs, avoiding the teacher's tendency to teach according to their own learning style. This sensitivity to the pupil's learning style apparently facilitates the pupil's success and improves achievements in exams in different academic fields (Miller 2001; Oshrat & Vidislavski, 2007; Wehrwein, 2007; Carrier, 2009; Fountain & Alfred, 2009; Howles & Jeong, 2009; Naimie, et. al.2010).

Would it also be more effective to adapt the teacher's speed of speech to the speed at which the pupils absorb the subject matter? It seems that if the teacher adapts the speed of speech to the general or average pupil's speed of absorption, approximately 10% of the class will become bored (Alloway, 2010).

There is no scholarly consensus concerning the correlation of the teacher's teaching style to the pupil's learning style but it is clear that by deepening the teachers' understanding and knowledge of learning styles (Fleming, 1995 Felder, 2002; Rosenfeld & Rosenfeld, 2004) they can be helped to understand that what they categorised as the pupil's laziness or lack of motivation is perhaps caused by the gap between their teaching styles and the pupils' learning styles.

Dunn and Dunn (1979a) and Rogers et al. (2009) claim that if the teachers are provided with practice in teaching pupils through the pupils' individual learning styles, most teachers can become effective for most of the pupils and provide them with a caring, humane and supportive atmosphere that will empower their learning process.

On the other hand, adopting a personal teaching style may also be relevant for the teacher. When teachers teach in ways adapted to their own personal style and philosophy, both they and the pupils can profit from this (Barth, 1980). If the aim is to make the learning more effective, how is it possible to ask the teacher to teach

according to the pupil's learning style, although they perversely do their best work when they teach according to their own learning style? (Barth, 1980). Is it realistically possible to test the learning styles of both teachers and pupils, and ask teachers and pupils to teach and learn according to their own styles for example by matching pupils with a certain learning style with a teacher who teaches according to the same style? (Sizer, 1984; Miller, 2001)

There are those who claim that both learning styles and the teaching styles are simply hypothetical structures offered as a useful tool to improve understanding for both teachers and pupils and perhaps also to explain important aspects of the teaching and learning process, and that no style is exclusive and pure without being combined with elements of other styles and that it is impossible to alter learning and teaching styles even to a slight extent (Fisher & Fisher, 1979; Felder 2002).

It was found that intelligent children sometimes do not succeed in learning in lessons taught frontally in the classroom, while contrastingly pupils who are less intelligent sometimes succeed more with such lessons (Brandt, 1990). What influenced their success or lack of success in their studies? Was it the extent of the match between the teacher's teaching style and the pupils' learning style? Was it the teaching method? Or is it perhaps impossible to distinguish between the teaching style and the teaching method, because sometimes the teaching styles can be embodied in the teaching method, for example frontal teaching includes the use of lectures which appeal to the pupils' Auditory perception and ignore Visual, Kinaesthetic and Reading/writing perception.

Can the concept of 4MAT be employed to divide the lesson time into four quarters so that in each quarter a different learning style will be taught, so that the lesson would suit all four learning styles? (See description of McCarthy's Model, Section 2.2.1).

Tanner and Allen (2004) suggested that the teacher should develop a teaching style composed of multiple pedagogies and should not adhere to a single pedagogy. In this way the teacher's teaching style would provide a response for pupils with different learning styles. Tanner and Allen (ibid) also suggest varying the teaching using multiple ways of representation (Rose, 2008).

Alexander (2000) and Willingham (2010) consider the dimension of the studied subject that necessitates other thinking on the pupil's part and different teaching on the part of the teacher (for example: the difference between science teaching and history teaching).

Most educational supervisors' efforts, to find characteristics that would make teaching more effective have failed (Almog, 2004), because of the difficulty involved in specifically identifying positive characteristics common to the teacher's personality and the pupil's learning style. In the opinion of Dunn and Dunn (1979a), it is difficult to interpret the observations, to find accurate ways of measurement and to evaluate the findings.

Dunn and Dunn (1993) included consideration of the learning environment in their models of learning styles (see Section 2.2.2.2: Dunn and Dunn Learning Styles), and within the learning process. They focused on the children's different needs for the following experiences:

- their need to identify and collaborate with other children,
- their ability to remember new and difficult material,
- their need for movement as opposed to passivity
- their need for group learning instead of individual learning
- their need to learn with children of the same age who may have authority, or judgmental or competitive.

The above-mentioned experiences are especially utile for under-achieving pupils and focusing on the differential need for these experiences can make the difference between learning success and failure (Dunn & Griggs, 2000). The following example clarifies the serious consideration of Dunn and Dunn (1979a) for the different needs of the pupils. They present the example of a Puerto Rican child Joee, whose status in the class was not good, however his nursery teacher was impressed by his abilities, saying that in her opinion he was a gifted child. After the child's learning style was examined, it became clear that the child needed informal learning; his learning style was clearly Visual.

In the case of Joee, he would focus better if there was a school with a special informal programme since he had internal motivation to learn, was responsible and

consistent, and had achievements. He succeeded well in an alternative programme. Using the diagnostic examination it was possible to identify the child's difficulties at an early age and to enable him to learn according to an appropriate learning style.

This case study is presented here as an example of how it is possible to diagnose and suit the learning style needs of the pupils to the teaching programme, allowing them to learn in their own way and to maintain their motivation and positive regard for the school.

Another example is given by O'Nell (1990) concerning a child who was unable to learn to recognise written musical notes, and could only identify them by listening so that he failed in the nursery. It was suggested to his parents that they should not transfer him to Year 1 in school. The parents transferred him to another school, where there was dual language learning, where he succeeded. It appears that something was different in the new school that suited his learning style.

But are these experiences realistic? Is it possible to create a learning environment that it adapted to the needs of all the pupils in the class (approximately 40 pupils in a typical Israeli class)? Is a child not stigmatized when they are labelled with a particular learning style? The response of Dunn (1990) to this question was that in her opinion the determination of the child's learning style would not cause stigmatisation and that everyone has their own individual preferred learning style in which they are strong. Wilson (2010) indicates that when a person knows their learning style this increases their self-awareness.

However, the issue of learning styles is complex, is it a single exclusive learning style or a combination of styles? Is it permanent? Is it acquired? Does it alter? Is it inherent? Is it age-dependent? Does it depend on excellence or intelligence? There is no academic consensus regarding these issues. Felder (2002) found that everyone uses a combination of learning styles but that one is always dominant, none of the learning types is a pure archetype.

Individuals gather, process, internalise and remember academic information according to their own preferred learning style (Dunn, 1993, Dunn & Dunn 1999; Dunn & Griggs, 2000), however Fisher and Fisher (1979) indicate that there is also a relationship between a person's learning style and the different learning stages,

which should be considered when determining learning styles. For example: it was found that most children before the age of 7 need a three-dimensional model of a room in order to perceive the spatial proportions and a particular size, while children between the ages of 9-10 can obtain this information from a two-dimensional model.

In a conversation between Brandt (1990) and Pat Guild, Pat explained his opinion, that having a particular learning style does not have implications for intelligence, and people with different learning styles can have the same level of intelligence. Thus too, it is incorrect to use identical teaching methods for an entire group of learners or to categorise a group of learners (excellent, average or weak pupils), according to an assumption that they have similar preferences regarding learning styles (Burns et al., 1998). The construction of work systems for pupils who are all categorised as having a particular learning style, should also take into account whether they have similar perceptual abilities and associations.

2.2.3.1 Section summary

In consideration of the above-mentioned sources, it seems that knowledge concerning learning styles can contribute to the discourse concerning learning between teachers and pupils, relating to the pupil's different learning preferences, clarifying how people learn or when they have difficulty learning, to what extent people see learning in a different way and how teachers can assist those processes (Coffield et al., 2004; Rogers et al. 2009). It is beneficial to talk with the pupils about their learning styles both in individual counselling sessions and in the class. Pupils can regain their confidence concerning their learning abilities, when they understand that their academic difficulties are not all due to personal disabilities (Felder, 2002) but may be affected by the way in which they learn and the way in which they are taught.

Having reviewed these theories and research concerning learning and teaching styles in depth, the researcher consolidated her convictions on these issues. Although some researchers dismiss the issue of learning styles as irrelevant, in the opinion of the researcher it is impossible to ignore the fact that different pupils assimilate and interpret the subject matter of their studies in different ways. From her experience in teaching and as a pupil she had learnt that when pupils are aware of their learning styles they are able to succeed better in absorbing,

assimilating and mastering the subject matter. This viewpoint is supported by researchers such as Blykan and Nacaz (2007) and Rogers et al. (2009).

Many teachers search for a wonder cure; yet one reason why these attempts often fail is that their innovative techniques are applied to all pupils without distinction instead of attempting to adapt them to individual styles of learning (Coffield et al., 2004). In order to succeed in implementing innovative teaching methods, pilot studies should identify for which pupils they are effective and for whom they are ineffective before adopting and recommending them for wider application.

If teachers take responsibility to respond to the differences between pupils, they can break with tradition and teach in a manner adapted to the needs of the individual, so that pupils who do not succeed in absorbing learning material today, will have a better chance of understanding and absorbing new and difficult information and achieving better results. Focussing on learning styles may thus produce more equal opportunities in education (Guild & Garger, 1997). Today it is also important to harness the new technology to the educational act (Ozpolat & Akar, 2009).

Since there is some confusion concerning the term 'learning style', the researcher believes it is important for the teachers and pupils to focus on the VARK learning styles which relate to the initial stages of absorption and processing of information. The researcher's experience in this research was that it is easy to explain the meaning of the VARK concepts to primary school pupils. Nevertheless the researcher acknowledges that it is impossible to modify the teaching style exactly for the learning style needs of each pupil in every lesson and given the fact that the world is now swamped with multimedia and advanced computer technology which present information in so many different ways, it seems important to examine how pupils react to a combination of different teaching styles. These issues inspired the researcher to perform this research.

2.3 Cognition

2.3.1Introduction

This section attempts to provide primary insights into the concept of cognition. This knowledge is relevant for the present research since it deals with cognitive learning styles, based on sensory perception (Visual, Auditory, Reading/writing and Kinaesthetic).

In order to avoid overstretching the boundaries of the research work, this section provides an overview of the main principles relating to cognition. It does not review all extant research or the leading researchers in this field. Nor does this chapter deal with learning disabilities, even though some of these have an impact on cognition.

The principles of cognition have also been applied to other fields of science, outside education such as industrial and administrative sciences, so that the cognition of companies and organisations is studied (Lant & Shapira, 2000), but these applications of the term 'cognition' are also beyond the borders of the present research.

2.3.2 Cognitive psychology & neurology

The cognitive revolution that has taken place in recent years has positioned cognitive perception as a central branch in psychological theory and as an extremely influential factor, both in the field of research and in the field of diagnosis and therapy (Kaniel, 2001). Cognitive psychology constructs theory concerning mental processes, such as reception, information processing, and memory, and consequently has areas of overlap with neuroscience, which deals with the physiology of the brain (Navon, 2001).

A relatively new field in academic curriculums is cognitive neuroscience, which combines cognitive psychology with neuroscience and studies the association of cognitive functions with the different regions of the brain. This new academic field became possible due to technological developments that enable computerised imaging of brain function in different research situations (Henik & Rubenstein, 2007).

The need to combine the knowledge of natural sciences and the humanities in order to promote education has been understood in Israel, as in various other countries around the world, and this is why an inter-university think-tank has been established, sponsored by the Ministry of Education's Chief Scientist, whose objective is to identify and study the interfaces where neuroscience, cognitive sciences and education are likely to engage, and the situations in which these interdisciplinary connections may be valuable (Neuroscience, Cognition and Education Institute, 2007). This present research adopts the concept that the resources of different disciplines can be combined to understand the primary concepts of this realm of cognition, and their connection to education.

2.3.3 The cognitive level

Discussion of the cognitive level, involves consideration of processes of the mind which facilitate the receiving, processing and organising and deciphering of information and storing it in the memory and drawing on it when it is required (Kaniel, 2001; Treitz, Heyder, & Daum, 2007).

Relying on the theories of Atkinson and Shiffrin (1968) and of Estes (1982, 1991), Kaniel proposed a model that helps to distinguishes cognitive from metacognitive concepts by drawing an analogy between a computer and the human brain in an attempt to identify the processes and products that traverse different areas and are unlimited in content.

A person receives external stimuli *via* the five senses: sight, hearing, touch, smell and taste. Kaniel (2001 – see Figure 2.10 below) argues that it is possible to incorporate a sixth sense which originates from within the individual, i.e. proprioception. This sense transfers stimuli to the brain from different body parts, and indicates where the various parts of the body are located in relation to each other and in relation to space. It influences the selection of entries, so that some of the stimuli do not enter the area of sensory register.

Sensory register

Sensory register relates to the concept of perception, the processes by which a person interprets and comprehends the information that is absorbed directly from the senses. This is the phase that handles the initial processing of information that does not require effort; the message stays in the processing space for a short duration and it may continue to the following stages:

1. The message may exit the system without undergoing processing.
2. The message may continue directly into the memory, without passing through the processing space.
3. The message enters the processing space and undergoes processing; following which it may either be stored in a reservoir or exit the system. (Kaniel, 2001, 17).

Memory

Baddeley (1990) defines memory as an intellectual process of preserving information in an appropriate reservoir, and the ability to draw out the information from the reservoir at a later time. Short-term memory is sometimes dubbed 'working memory' and the capacity of this space differs in different people. For example most young people can only store four items within this area, so that teachers are required to give no more than four instructions at a time, to prevent pupils from neglecting their learning of the subject matter since they sense that the teacher's speech includes too many details for them to remember. Pupils also note the speed of the teacher's speech. Nevertheless in some children this capacity is larger, and if the teacher adapts his/her rate of speech and the number of items mentioned to the abilities of those with a smaller capacity, then 10% of the pupils may find the lesson boring (Alloway, 2010).

Perception

The systems of sensation and perception express the relations between the internal world of the living being and the environment surrounding it to which it must adapt (Zakai, 2003).

The concept of 'perception' relates to the data-processing and interpretations of expressions that were received (Zakai, 2003). Perception is the contact of the

brain with the external world, absorbing the data transmitted to it by the senses (Gruba & Hefteflisch, 1992). 'Sensation' refers to the physiological responses of sensory organs to external stimuli (Zakai, 2003). The different senses provide the brain with information about the external world and the brain interprets and employs this information to construct concepts about reality.

The sensory system translates external stimuli of physical energy to sensory signals, transmitted by the central nervous system. The perception processes entail the processing of information received by the sensory system; such processing facilitates the attribution of meaning through conscious-cognitive processes. Perception forms the foundation for more complex thought processes, such as recollection, comprehension, judgment, etc. (Zakai, 2003).

Perception processes include time-perception, spatial perception, Visual perception, Auditory perception, etc.

- Visual perception relates to the way that the brain absorbs, translates and understands all that the eye sees. This type of perception is involved in the Visual learning style studied in the present research.
- Auditory perception relates to the brain's ability to absorb and provide meaning to sound stimuli. Auditory perception depends on the individual's ability for sequential ordering. A series of sounds is perceived as a single perceptual event and the entirety of the form has meaning beyond the meaning of its individual parts. In contrast to Visual perception in which it is possible to repeatedly return to the stimulus and review it, Auditory perception also depends on the dimension of time, since the Auditory stimulus, due to its very nature, simply disappears. The Auditory data must therefore be absorbed in memory within a short time and undergo processing. This type of perception is involved in the Auditory learning style studied in the present research.

Perception is a process that includes the reception of stimuli and processing them in the memory; it is the basis that enables recollection, comprehension, judgment and other high cognitive processes (Sharoni-Yitzhak, 1990).

The Processing Space

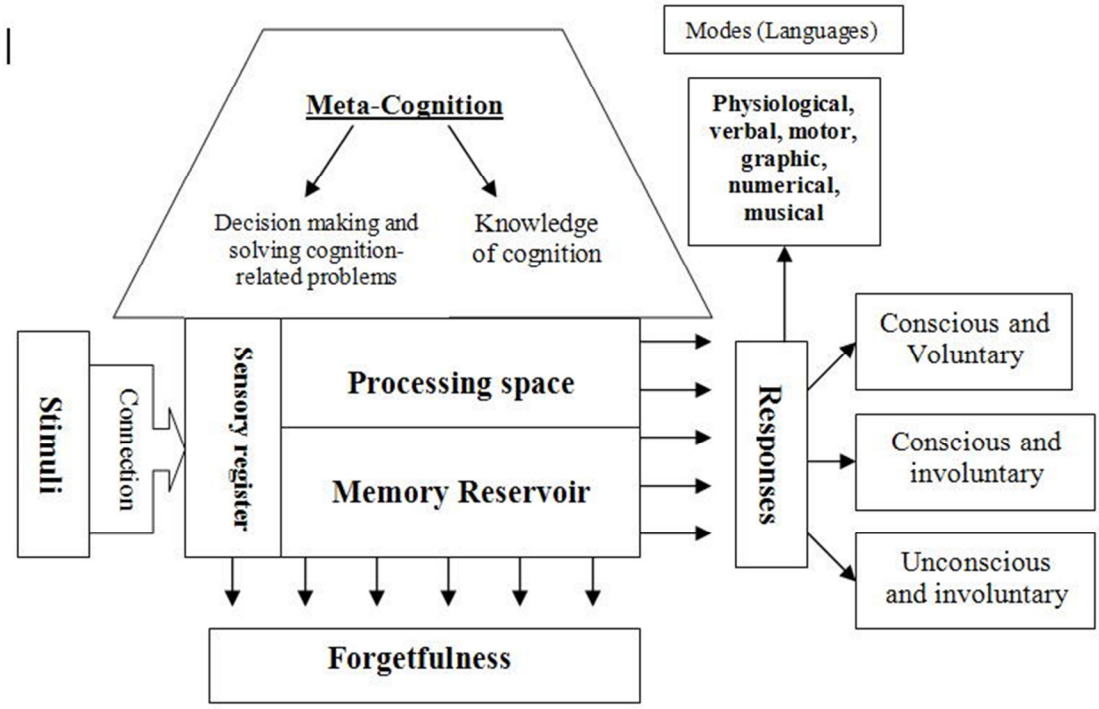
The processing space is the operative memory of the brain; it is the component that holds and processes the information (Kaniel, 2001). Responses to stimuli may be divided into six types (Kaniel, 2001):

- Responses that are expressed as external and internal physiological phenomena, such as sweating or, alternatively, a change in digestive fluids or adrenalin
- Motor responses, walking, fine and gross motor responses
- Verbal responses, reading and writing
- Graphical responses, painting or sculpting
- Arithmetical or numerical responses
- Musical responses

The individual's degree of awareness to, and control over these responses, e.g. automatic reactions during driving, or hand movements when speaking (Kaniel, 2001) also affect the memorisation process. According to Navon (2001), it is sometimes impossible to identify the source of visible reactions; for example, the difficulty to perform two tasks simultaneously – is it due to the fact that the brain processes information in a sequence? Or perhaps the brain also processes information in parallel, but the storage volume is too small or is there a reciprocal disruption in simultaneous parallel processes. These questions still preoccupy researchers in this field (Navon, 2001).

Kaniel's Model of Cognition analogises the brain to a computer, providing a structural image of the processes that occur in the brain. The model is presented graphically below in Figure 2.10 in order to facilitate the comprehension of various concepts in the realm of cognition. This comprehension will help in drawing a distinction between different styles of learning.

Figure 2.10: Kaniel's Model of Cognition



(Source: Kaniel, 2001, p 16)

The Metacognition Level

Flavell (1976) who coined the concept of metacognition, describes it as follows:

> *Metacognition refers to one's knowledge concerning one's own cognitive processes or anything related to them, e.g. the learning-relevant properties of information or data. For example, I am engaging in metacognition if I notice that I am having more trouble learning A than B; if it strikes me that I should double check C before accepting it as fact* (ibid, p.232).

In 1979, he extended his definition of meta-cognition, arguing that it is comprised of **information** on the one hand, and **experience** and **monitoring** and **control** on the other, adding the component of experience to his previous definition.

Kaniel (2001) and other scholars simplify this definition when they refer to meta-cognition as 'thinking about thinking', Kaniel explains that this involves two processes – a person's knowledge of his cognition, and cognition-related decision-making and problem-solving, i.e. monitoring and control.

According to Koriat (2003), the brain's cognitive level engages in processes that facilitate receiving information, processing, organising and ciphering it in the memory, and extracting the information from the memory when required. The meta-cognitive level controls and manages the cognitive level, and makes the following decisions

- Which material should be studied?
- For how long?
- Which strategy should be chosen?
- Identification of the individual's state and decision-making (Koriat, 2003).

Flavell (1979) considers that meta-cognition knowledge is divided into three parts:

- Knowledge people possess concerning themselves;
- Knowledge people have regarding the tasks that they face;
- Knowledge people have regarding the strategies at their disposal.

Thus knowledge concerning an individual's learning style would be categorised as a person's meta-cognitive knowledge of themself. Learning for an examination is a task, and the person's knowledge about examinations is the knowledge that the person has regarding the task; the student's use of a particular learning style to complete the task of an examination is the strategy employed for purposes of learning, and this constitutes strategic cognitive knowledge.

Meta-cognitive control is performed through experimentation with meta-cognitive strategies, to ensure the performance of actions in the best possible way, and to examine the products of such actions. Various researchers (Kluwe, 1982; Brown, 1987) have added additional concepts to clarify this distinction between knowledge and control indicating that concepts such as planning, follow-up, examining, detecting mistakes, correction and decision-making, mutually interact as part of the control process (Brown, 1987). It has also been theorised that **processes of regulation and management of meta-cognitive thinking**, are performed by **monitoring and control** processes (Kluwe, 1982). Monitoring processes include: definition of the task, examining its progress, assessment and influence of the assessment on the on-going progress; while control processes include: allocation

of resources, and making decisions relating to the priority, intensity and speed of the actions. Despite their different definitions of meta-cognition, all researchers emphasise **knowledge and control** as the basic characteristics of the meta-cognitive system (Schraw & Moshman, 1995).

Osman and Hannafin (1992) suggested that the meta-cognitive level, also includes components relating to memory management, and the development of structures, as well as the transfer of information – this is a field of particular interest to researchers in education.

Koriat (2003) argues that children's meta-cognitive development naturally reaches maturity during late childhood, i.e. approximately at the age of nine years. However, research conducted in several kindergartens in Israel with children of a younger age (5 years old) showed that training in meta-cognitive methods was evidently effective in improving cognitive achievements of kindergarten children (Ofir & Globman, 1994).

Today, there are numerous on-going studies that relate to the meta-cognitive level, with the aim of better understanding these processes, and clarifying how humans 'know that they know'. According to Koriat (2003) the situation in which a person knows a word yet is unable to recall it; known as having the word 'on the tip of the tongue' is a phenomenon attesting to meta-cognitive activity, since the person knows that he has an item in his memory although he cannot remember its details.

As mentioned above, attempts have been made to find an optimal way to improve meta-cognitive processes amongst young children, older children and students.

Margaliot (2005) conducted research in order to design a training programme to nurture melioration (high-level theoretical thinking skills) among science teacher-training students. She examined 60 students who studied in the science teachers' training course of a teachers-training college in Israel. She constructed an intervention programme to foster thinking on 'energy', which integrated employment of cognition and motivation in the learning process. The study showed that the students did not only improve their knowledge concerning energy, but also enhanced the following thinking performances: broadening their general knowledge regarding the studied material, improvement in indices of openness to

understanding situations, creative thinking and relinquishment of introversion. A correlation was evident between motivation to study and cognitive change.

2.3.4 Teaching as a cognitive skill

Teaching is also a cognitive skill that must be practiced for improvement, and the teacher should check which aspects of their teaching are suitable for the pupils, and which parts need enhancing. Improvement should be based not only on experience but also on feedback and conscious effort (Willingham, 2010).

2.3.5 Social Cognition

Social cognition is employed by a person to process social situations (Nadler, 2000). The assumption is that people try to gain accurate impressions of the world, although they often make errors in their impressions. Since people are different, their social cognition is also different; that is, different people process a social situation in different ways.

The classroom constitutes a learning environment but also contains emotions and social relations (Willingham, 2010). If the educator can in addition to imparting knowledge, intelligently create a creative and effervescent, energetic learning environment, with positive social relations and emotions, there is a chance that this may become a learning space that the pupils will enjoy.

2.4 The Use of Multimedia in Education

2.4.1 Introduction

The successful introduction of the computer in all areas of human activity during the latter part of the 20th century, engendered hope in many countries that this technological innovation would also lead to a revolution in education (Hativa, 1989). Different applications were designed for the computer, among them multimedia, intended for use in publicity, lectures and even in schools. Today multimedia has penetrated many fields, and the 'whiteboard' or 'intelligent board' with its multimedia applications now replaces the blackboard with chalks used in traditional classroom teaching. The introduction of the computer in daily life has led to academic discourse concerning the elements that appear in multimedia: Visual elements (pictorial animation, pictures, coloured emphases, video-film),

sounds and texts. Some scholars indicate that animation constitutes a cognitive burden, a superfluous element that interferes with learning (Scaife & Rogers, 1996; Lowe, 2003). Other scholars contrastingly indicate that if pictorial animation is suitable for the message that it attempts to transmit it actually has a positive effect on learning (Barak et al., 2011). Attempts have been made, for example by Clark and Mayer (2003) to derive principles for the construction of effective multimedia presentations from the many studies in this field and research concerning the different uses of multimedia in education is currently abundant (Baturay et al., 2010; Broza &Ben-David Kolikant, 2010)

In 1997, the Israeli Education System also invested huge sums to equip the schools with computers, aiming to eventually supply a computer for each child. Eizenberg (1997) indicated that it was insufficient simply to provide the schools with this equipment, and that high quality teaching, determination of didactic priorities, appropriate learning materials and teaching methods and specification of the target population should also be provided. Almog (1997) also complained about the premature introduction of computers in the education system before the provision of a suitable supportive technical, pedagogic, teacher-training and research infrastructure. Over time many studies have been conducted concerning this issue and the integration of the computer has begun to produce benefits (see below) (Broza & Ben-David Kolikant, 2010; Barak et al., 2011). The Israeli Ministry of Education has attempted to apply lessons learnt from previous years of experience in order to prepare for the 21st century, aiming to create an appropriate pedagogy that also include necessary changes in teacher training (Ministry of Education, Israel, 2011).

This section attempts to clarify the implementation of a particular area of computer propensities, known as 'multimedia'. Although multimedia is used in many fields such as, the law, economics, medicine etc. (Kohan & Gerber, 2003), this section focuses on the use of this tool in education, in order to prevent any deviation beyond the study's boundaries. There is no intention to discuss hardware constrictions and technological aspects of multimedia.

2.4.2 Definition and terminology

'Multimedia' is exactly that: the employment of multiple media and may include the use of a collection of Visual, Auditory and textual media. Feldman (1994) defines multimedia as a combination of words, sounds and pictures in electronic form. However in the context of computerisation this becomes:

> *Any combination of two or more media, represented in a digital form, sufficiently integrated to be presented via a single interface, or manipulated by a single computer program interactively* (Chapman & Chapman, 2009).

An example of multimedia can be found in the preparation of Microsoft POWERPOINT presentations. The computer programme allows words, pictures, sounds, films and links to be included within a single file. Control of the presentation depends on the user, who can stop the presentation to explain what is shown on the screen and then continue at will as necessary. This form of presentation complies with the criteria of Chapman's definition.

In line with this definition, should a digital film also be considered as multimedia? It seems not. Although digital film integrates different media: sounds, texts, pictures and pictorial animation it lacks the interactive element, the ability of the operator to stop the film, to move with ease to another part, and to intervene in the presentation of the data (Kohan & Gerber, 2003).

2.4.3 Uses of multimedia

The computer era has rapidly advanced the use of technology in education expressed in computer-assisted teaching, educational computer courseware, expert systems (expert assistance, graphic files providing information required by the user in a user-friendly format and based on multimedia software), simulation, data banks, digital networks, multimedia etc. In order to derive the best possible educational benefit from these innovations, appropriate learning principles need to be established such as: constructivist learning (Appendix 2.1: Teaching Methods) deeper understanding instead of memorization of knowledge, learning in a social and collaborative context, exchange of knowledge and data etc. (Salomon & Perkins, 1996).

At first, the education system prepared structured multimedia software for the learners, mostly exercises which the learners used to practice mathematics, grammar etc. Later with the development of computer technology intellectual interaction with the learning materials became possible, enabling learners to relate to data and design, with easy access to communications technology in learning environments developed according to the constructivist approach (Salomon, 1997).The following are examples of the use of multimedia in the context of education:

1. ***Presentation preparation by learners*:** following the constructivist approach, pupils work in school on the preparation of multimedia presentations (Barkai et al., 2004) on particular learning subjects. This approach supports the pupils' learning through construction, the teacher guiding the pupils through the field of content and supervising their behaviour. The pupils are thus able to acquire knowledge and learning processes through the construction of multimedia presentations on specific subjects. Meaning that the pupils acquired knowledge in computer technology instead of acquiring the requisite knowledge in the area of content that they dealt with (Kromholtz & Hass-Markoza, 1997; Barkai et al., 2004).
2. ***Multimedia presentation for the acquisition of knowledge*:** teachers use multimedia presentations to transmit basic knowledge on particular subjects, accompanied by pictures, sounds, video events and text. For example: 'Say No to Drugs!' (Gropper, 2002) a programme that explains the results of drug abuse, educating children to refuse drugs, employs a presentation prepared by professional educators in this field of knowledge, delivering specific information concerning this issue and enabling the pupils to interact with the situations that appear in the presentation.
3. ***Multimedia presentations used by lecturers in lectures*:** whiteboards are prevalently used by schools to screen multimedia presentations and teachers also use interactive presentations with feedback similar to those constructed by the researcher for the experimental lessons of her research. However in the year of the research – 2004 – whiteboards were not yet available for use in schools in Israel. Today the Israeli Ministry of Education

(2011) understands the contribution of this equipment and whiteboards have been introduced into Israeli primary schools and throughout the education system.

4. ***Multimedia presentations for lecturers***
5. ***Multimedia presentations to summarise research: Practical use of multimedia:*** ready-made presentations to help students in their practical work.
6. ***Multimedia programmes as simulators:*** another application enables research by allowing the pupil to intervene in a multimedia system by feeding data into the system and an observing the resultant change and learning by trial and error.
7. ***Interactive multimedia story***: In interactive multimedia stories, the user sees and hears the text and pictorial animation is also added. The user can stop the presentation and perform several things during the story, such as accessing explanations of difficult words, going back to an earlier chapter, or interacting with the animation. A study that examined the use of interactive computer stories in order to reinforce literacy among children with difficult reading disabilities found a consistent increase in the identification of words of the story over time and improved development of literacy (Hetzroni & Eschanin, 2002).
8. ***Interactive multimedia games***: the many interactive multimedia games available on the Internet and on discs, can also serve educational purposes by enriching knowledge on specific subjects that is learnt in an enjoyable experiential way, developing creative thinking, improving eye-hand coordination, creating intellectual challenges and producing the psychological benefit of tension-relief (Kohan & Gerber, 2003). In a comparison between video games and book reading, Oblinger (2004) understood that the pupils became absorbed both body and mind in the game so that this enhanced their memory.
9. ***The Tegrity System***: The Tegrity system is a class capture web service, which enables the transmission of a lesson presentation screened on a whiteboard using laser to mark and write in a coloured pen on the board. As

in traditional teaching the teacher stands by the whiteboard and lectures. The effect is stronger and more effective than a simple computer presentation. The lectures are also transmitted online to distance-learners, and they can either participate in the lesson or view them after the lecture ends. The double and triple repetition that is made possible by this tool is its main benefit, since students can access the lecture online while in progress or instantly recall key class moments for replay online, or on iPods and mobile devices for revision purposes after the lecture ends (Frank & Bernstein, 2002).

2.4.4 Empirical research concerning the use of multimedia in education from 2006 to 2011

Several studies have examined the use of multimedia systems in education; a selection of these studies is presented here:

- Participants (autistic children) who received emotion identification tasks through multimedia programmes demonstrated an improvement in emotion identification when they examined faces appearing on the screen (Golan & Baron-Cohen, 2006).
- Israeli Ethiopian-origin children aged 8, demonstrated a significant improvement in their learning achievements after they watched multimedia presentations on their learning material (Gitait, 2006).
- A programme combining various media intended for use in the nursery and at home, concluded that pupils who used the multimedia programme showed greater progress in literacy skills (Shleifer et al., 2006).
- A study examining the contribution of a multimedia environment to the improvement of control of mathematical skills in collaborative learning in a nursery according to age group found a significant improvement in various mathematics skills for those who studied in the multimedia environment, including their grasp of concepts and subjects relating to mathematical processes and actions. There was a more significant improvement among the younger pupils (Kramarski & Weiss, 2007).

- Research attempted to examine which multimedia applications were most effective in online learning (computerised courses in universities). The following multimedia representations were examined: static pictures, digital animations and pictorial animations with accompanying oral commentary. The research found that learners in a computerised learning environment observing static multimedia learning materials invested less time in learning than those who were exposed to pictorial animations alone. Significant differences were found between the experimental group and the control group regarding the understanding of the knowledge that they absorbed. Those who studied in computerised university courses and were exposed to learning materials that included static graphic presentations revealed lower cognitive abilities in comparison to learners who were exposed to learning materials presented in pictorial animations. No significant differences were found in the level of understanding of knowledge between the groups exposed to pictorial animation accompanied by oral commentary and those who were exposed to pictorial animation accompanied by digital texts. (Other studies have found that that such a significant impact for multimedia on understanding did not appear uniformly in all areas of knowledge. In the fields of medicine and sciences/engineering multimedia presentations have a very strong impact while in the fields of social sciences and humanities - including education - the effect of multimedia on understanding of knowledge is insignificant) (Lapu Bele & Rugelj, 2009).
- The acquisition of observation and surveillance abilities for student-teachers, regarding pupils' ability to cope with reading and texts is an important task within teacher-training programmes, but it is difficult to achieve and constitutes a challenge for teacher-educators mentoring student-teachers in primary and middle schools. In the USA, the effectiveness of various technological environments intended to facilitate student-teachers' acquisition of observation skills has been examined in research on two strategies, the first based on multimedia technology and the second on video films. These studies show that the multimedia environment is to a certain extent preferable to the environment that employs digital video film for the acquisition of these skills (Baker, 2007).

- Two experiments examined the distribution of Visual attention in textual and pictorial learning, where one group learnt with the assistance of black static pictures and the second group learnt with the aid of dynamic coloured pictures. Although the test revealed no significant differences between the groups, Baytiyeh and Naja (2010) recommend that teachers should use interactive multimedia applications in order to advance active learning in the classroom.
- Recently, multimedia programmes have been employed to study history in schools in Scotland where they have been found effective (Hillis & Calderhead, 2009).
- A quantitative study (Barak et al., 2011) investigated scientific studies assisted by animated video films for all Year 4 and 5 pupils (n = 1,300) in the town of Holon, Israel. In contrast to the findings of other researchers who found that Visual elements applied together with other elements produce a cognitive burden and interfere with learning (Scaife & Rogers, 1996; Lowe, 2003), Barak et al. demonstrated that all the pupil participants in their study showed twice as much progress in their understanding of science and in their motivation to study science than did a control group (Barak et al., 2011).
- A study conducted in Israel investigated the use of a context story (a mathematical story) as a tool to significantly upgrade learning among mathematical under-achievers, comparing a dynamic Visual mediator and a textual mediator. It was found that pupils who received lesson with a Visual mediator achieved better learning achievements than the group who only received textual stories. However the findings also show that exposure to a Visual mediator is not sufficient. In order to create a change in the thinking of pupils who have difficulties in learning, intensive work must be invested by the teacher to link the accessible computerised tool to mathematical knowledge and to encourage the pupils to alter their discourse from discourse concerning procedure to discourse concerning meaning (Broza &Ben-David Kolikant, 2010).In Britain in 2009, a researcher diagnosed the learning styles of medical students with the VARK test. She then created lessons appropriate for these diagnoses using a multimedia presentation which she introduced into their laboratory work, in addition to exposing them to written texts so that all the Visual, Auditory, Reading/writing and Kinaesthetic elements were combined in

the lessons. Her research investigated whether teaching the students according to their preferred learning styles improved their learning. Additionally the study investigated which styles were preferred by gender and found that the preferred learning styles for male students were Visual and Kinaesthetic while women students mainly preferred Reading/writing. Additionally most of the participants reported a positive alteration in their performances in that semester. Most reported that they received better grades than usual in their mid-term examination and one noted that his method of recording notes had improved. These reactions were encouraging (Rogers, 2009).

- Another study in 2007-2008 examined attitudes of students studying English as a second language at an elementary level in university (Gazi University School of Foreign Languages in Ankara, Turkey) towards the learning of grammar through multimedia on the Internet. It was found that the students enjoyed using the application, understood the subject matter and developed a positive attitude towards the system (Baturay et al., 2010).
- Passig (2003) developed a computerised learning programme to teach melioration skills as a heuristic strategy for solving unclearly defined problems among girls and boys in Years 6 and 7. The development of the programme is significant as it responds to the need to train pupils for a world that requires flexible and innovative thinking based on the increasingly growing expanse of human knowledge accessible to everyone at any time and in any place.

The present study combined different styles in learning: verbal, Visual and Auditory in a learning programme constructed as a multimedia multi-sense interface using different intelligences, offering a virtual learning space within the multimedia interface, and an opportunity for the development of melioration skills to attain cognitive and technological goals of the education system and enabling the realisation of the pupil's human potential.

2.4.5 Summary

There have been numerous attempts to introduce computerisation and teleprocessing into education and teaching. Nevertheless, many teachers sense that they are wandering in an unknown domain and the results of these attempts

have often been disappointing. Yahalom (1997) examined the factors that affect this phenomenon, including a lack of a suitable communications and computer infrastructure and especially suitable technical maintenance and indicated a need to strengthen the motivation of educators in this field.

Since 1997 several years have passed and the computer and accompanying technology now serve man in almost every field including education where the introduction of multimedia into the classroom has been studied and it seems that it provides a wide ranging positive influence.

Nevertheless Barkai et al. (2004) maintain that when teachers want to increase knowledge acquisition on a particular subject, it is preferable not to waste time on the construction of multimedia presentations by learners since they are drawn to the pictures and pictorial animations and secondary Visual means and neglect the content of the studied subject.

From a different aspect, the study by Eshet and Chajut (2007) found a correlation between the active hemisphere (left or right) of children's brains and the satisfaction they derived from the construction of multimedia presentations. Those who had an active right hemisphere, and also the boys rather than the girls were more satisfied and preferred to construct a presentation rather than write their work, and they also invested more in the construction of the presentation and felt that the presentation contributed more to their knowledge. In other words it seems important to investigate the link between the application of the learning style of the pupil and their learning preferences with the success and interest that they show in their studies.

According to Salomon and Ben-Zvi (2006) novel educational environments should be constructed, which would allow effective use of communication technology in education and teaching in order to realise the potential of this technology as an auxiliary tool for teaching.

From the evidence provided in this section, it appears that in most cases, attempts to employ multimedia in education impact on the fostering of wide-branching thinking expressed in in-depth and broad conceptualisation, inter-disciplinary thinking, flexible thinking and the development of 'in-action' thinking and complex, dynamic problem-solving (Vadmani, 1994).

Today the introduction of the new computer technology in the classroom is essential because, as is well understood by educators involved in the education system, this is the new learning cyberspace in which the pupils live (Dede, 2009, although the necessary pedagogical knowledge to use this technology effectively for learning is still developing (Ministry of Education, 2011).

2.5 The Conceptual Framework of this Research

The study aimed to examine whether lessons that combine different teaching styles (Visual, Auditory, Reading/writing and Kinaesthetic) hinder or assist the learning of primary school pupils with different personal learning styles, according to the pupils' responses to the lesson. Thus, the study's conceptual framework included consideration of theories, concepts and research findings from the following areas of knowledge:

- Learning styles
- Cognition
- Multimedia

2.5.1 Learning/Teaching Styles

This is a broad area of knowledge, and the use of the term 'learning style' is often ambiguous or unclear (see Section 2.2: Learning Styles). This area of knowledge includes many different theories and research (Coffield et al., 2004); however for the purposes of the present study's conceptual framework, the researcher chose three theories that relate to sensory perception:

- The theory of Rita and Kenneth Dunn (Dunn, 2000 – see Section 2.2.2.2: Dunn and Dunn Learning Styles). That relates to five distinguishing areas of learner characteristics: environmental, emotional, sociological, physiological and psychological. The researcher related particularly to the physiological category of this theory.
- The theory of Felder and Silverman (1988) including consideration of the learner's preferred manner of presentation and absorption of information.

- The theory of Fleming and Mills (1992) that distinguishes the following four perceptual learning styles: Visual, Auditory(Aural), Reading/writing and Kinaesthetic, and combinations of these learning styles and their tool the VARK test that diagnoses these styles (see also Section 3.7.2: Pre-Research Preparations). This tool was employed in the present research to diagnose and understand the pupils' learning styles. The VARK theory's consideration of different learning styles relates to issues involved in Cognition which was chosen as the second component of the Conceptual Framework.

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2.5.2 Cognition

Cognition relates to the mind that absorbs information, including processing, organisation and storage in the memory and extraction of information when necessary (see Section 2.3: Cognition). Assimilation of the information takes place in the 'sensory register', a term that resembles the concept of perception, involving the processes by which a person interprets and understands the information that comes directly from the senses. This is the stage where the information undergoes initial processing, from data collected by the perceptions mentioned by Fleming and Mills (1992) (Visual, Auditory, Reading/writing and Kinaesthetic). For the purposes of this study the researcher created special lessons that included all four types of perception and could be used in the lessons as a multimedia tool, combining the use of all the three senses: Visual, Auditory and Reading/writing in a multimedia presentation, followed by Kinaesthetic work in a special exercise book. These lessons necessitated the use of multimedia – thus this issue was also included in the conceptual framework.

2.5.3 Multimedia

As its name indicates, multimedia involves the use of multiple interactive media (see Section 2.4: The Use of Multimedia). The computer enables wording, pictures, films, links and voices to be integrated within the presentation. The presentation can be controlled by the user, who can stop the presentation at will, explain what appears on the screen and continue as needed.

The researcher created lessons on the subject of language for Years 5 and 6 with the help of Powerpoint software. This tool was used by the teachers for the heterogeneous class, over one school year, providing consideration for the different learning styles of each pupil, diagnosed according to the VARK test of Fleming and Mills (1992).

The present study is the product of the researcher's personal and professional experiences, as a pupil and a teacher and later in her present function as a lecturer on computer applications, multimedia and education in a teacher training college. The researcher wanted to examine what pupils experienced and how they would respond to special experimental lessons that included the use of the different multiple teaching styles in accordance with the pupils' own individual learning styles. The researcher investigated which of the perceptive elements of the teaching styles were experienced by the pupils as influencing their understanding and mastery of the studied learning material, their concentration abilities, memory and motivation in relation to their own specific learning style, attempting to determine whether certain elements were experienced as facilitating these processes, or if there were elements, which were experienced as hindering these processes because they were ineffective or superfluous or distracting.

2.5.4 Measurement of the pupils' responses

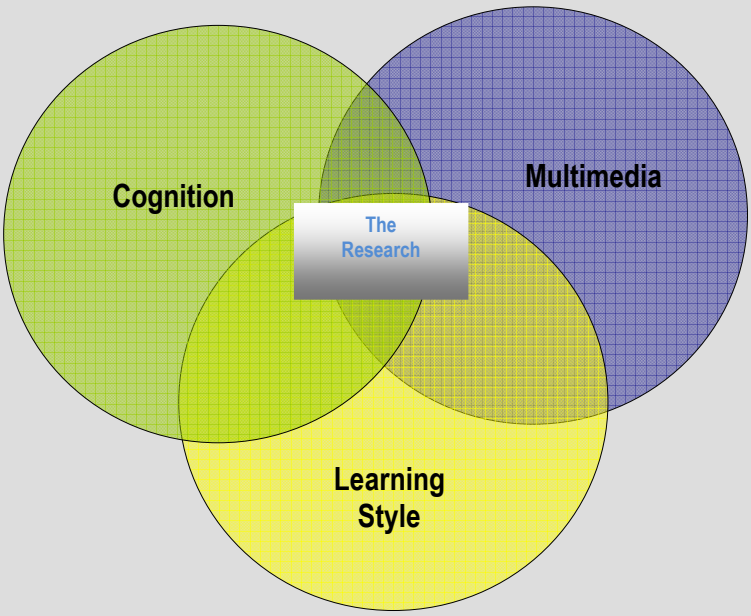
In the present study the researcher relates to three concepts to measure and evaluate the pupils' experience in the experimental lessons that combined different learning style in relation to the pupils' learning process (centre of Figure 2.11 below) according to the pupils' responses: 'assist' (a positive expression) and 'hinder' (a negative response) and 'did not assist' (something which did not serve the purpose or was experienced as unnecessary). Logically assist is positive and hinder is negative.

The term 'did not interfere' is considered a positive term, since the element did not interrupt the pupil's sequence of absorption of the subject matter and the pupil was able to learn without any interference by the element. Logically 'interfere' is negative and 'did not interfere' is positive. The pupils' responses were the source of these definitions – for example the word 'assist' was derived from positive

expressions such as *'I listened and looked at the presentation'* in contrast to various dictionary definitions.

The researcher's investigation of the pupils' responses to the experimental lessons according to their diagnosed learning styles was supported theoretically by the combination of the concepts described above. This conceptual framework is represented visually below in Figure 2.11.

Figure 2.11: The Conceptual Framework of the Research - Responses of puipils diagnosed with different learning styles to lessons that combine different teaching styles (Visual, Auditory, Reading/writing and Kinaesthetic)



2.6 Motivation

Having read and studied the research findings, the researcher discovered expressions which she found it difficult to interpret; further study and review of the literature directed her to concepts relating to motivation for learning that assisted the interpretation of these findings.

This section deals with motivation for learning. It does not go deeply into the issue of motivation, but does relate to several of the concepts and theories concerning motivation that provided a theoretical basis for the analysis of the research findings.

Theories of motivation have captured an increasingly more important position in academic discourse (Pintrich & Schunk, 1996; Bettler, 1996) and especially the consideration of motivation to learn, involved in the improvement of learning and teaching and have underpinned attempts to develop schools as a challenging, interesting and creative environment.

What then is motivation? 'Motivation' is a term that describes motives for behaviour, including choice between alternative goals and means. Theories of motivation try to explain the processes that motivate people to act in a particular way (Assor & Kaplan, 2001).

Assor (2005) defined *'the term motivation as relating to the desire to invest time and effort in a particular activity, even when this involves difficulty, a high price and lack of success*' (p.5).

The academic debate on the issue of motivation relates to two main types of motivation: intrinsic motivation and extrinsic motivation. Assor (2005) indicates that since motivation, as defined above, relates to behaviour, it cannot be seen as a dichotomy (intrinsic or extrinsic) but should be perceived as a continuum relating to the individual's sense of autonomy. He defines intrinsic motivation as a sense of choice and meaning at one extreme of the continuum, while extrinsic motivation is a sense of coercion and lack of meaning at the other extreme. An entire continuum of different levels of the sense of autonomy runs between these extremes.

Extrinsic motivation relates to investment due to fear of punishment or out of hope for a material reward or for privileges. This is expressed in feelings of subjection to coercion, lack of meaning, fear, hope and anger (Assor, 2005). Intrinsic motivation relates to interest and pleasure, investment of effort and time without material reward or external pressure (Deci, 1971; Deci & Ryan, 1985).

Motivation is evaluated according to three dimensions: direction, intensity and quality of motivation (Maehr, 1984; Maehr & MIdgley, 1986):

- Direction is the choice of dealing with one particular action and not another
- Intensity relates to the extent of investment in the activity
- Quality relates to identification and distinction between different types of motivation.

In contrast, Assor (2005) assessed the motivation to perform a particular action according to the following two dimensions:

1. Strength of the desire to invest in the activity
2. A sense of autonomy, meaning whether the desire to invest in the task stems from the individual's sense of free choice.

The theoretical model known in the literature as Self-determination Theory (SDT) was developed by Ryan and Deci (2000a) on the basis of Humanist principles. They argue that if the motivation is more intrinsic, then it will be of a higher quality.

This theory emphasises people's universal inclination for psychological growth and development. The factors considered necessary for healthy development relate to the satisfaction of three basic needs: the need for connection, belonging and safety, the need for a sense of self-efficacy and the need for autonomy. These three needs are inherent and universal; their satisfaction contributes to optimal development, mental health and social assimilation, intrinsic motivation and wellbeing. According to this theory, when pupils' basic needs for autonomy, efficacy, connection and belonging are satisfied, the pupils will perceive their motives for behaviour as stemming from within themselves and will have intrinsic motivation for their activities.

The need for connection, belonging and safety (relatedness) is a need to conduct close confident and fulfilling relationships with others in the social environment and

to be protected physically and psychologically. The need for a sense of self-efficacy is the person's need to experience themself as able to realise plans, aspirations and goals, which are not always easy to attain, to feel a sense of effectiveness. The need for autonomy is the person's need for self-direction and regulation of their activities, the need for self-expression, for meaning, for independence and freedom of choice. At a deep level this involves the person's need to realize their potential and inclinations and to actively form goals, attitudes, values and plans, in other words to realise their identity. A person's social environment can support the individual's natural inclination for active involvement and personal growth or alternatively it can suppress it**.**

2.6.1 Relatedness

A sense of belonging and connectedness relates to the relations between one person and another, how the child sees their relations with others. For example: if the child experiences themselves as important to society and feels that they are concerned about them, then this gives the child a sense of belonging that empowers their motivation to do things. This experience helps to support a sense of internalization in the transition from extrinsic motivation to intrinsic motivation and helps to develop a sense of autonomy. People may have motivation to perform something if they feel that they are important to others and that others (parents, friends, and teachers) care about them. This sense of belonging to others reinforces motivation and is called a sense of 'relatedness' (Assor, 2003). According to SDT if a person feels closer to others from a social and learning point of view, this influences the achievement of goals, values and 'caringness', creating a sense of confidence and a feeling of worth (Ryan & Deci, 2000a), and the ability to be respected and loved. This is expressed in a system of relationships i.e. high quality interpersonal connections.

People feel happier and more excited when their activity is accompanied by experiences of warmth and support from the teacher. When the child is in an environment of people who respect them and feel accepted and loved, then the child creates positive interpersonal relations with others and wants to contribute (Wehlage 1989; Assor, 2003).

2.6.2 Self-efficacy

A sense of self-efficacy relates to a person's belief in their ability to learn or create (Bandura, 1986; Bandura, 1997). The Self-System model of Connelly (1991) calls self-efficacy 'ability' and defines it as the ability to create a desired result and to avoid a negative result.

Jacobson (2000) claims that pupils who have had previous successes in a particular discipline will have more confidence and a stronger sense of efficacy and this supports their development of more ambitious future achievements for themselves. Schunk (1991) suggests breaking up large tasks into smaller ones. In other words, the children are presented with the same subject at different levels of difficulty, gradually giving the children a sense of confidence that they have the ability to perform the task. In other words the learners themselves attain the information that shapes their feeling of self-efficacy through their performance of the task. This confident feeling is created when the child succeeds in performing something, through experimentation, since the child receives positive feedback from others: such expressions as 'wonderful', 'excellent' and these reactions improve the child's sense of self-efficacy, so that the child invests greater effort, and consistency (over time) and produces more positive achievements (Bandura, 1977; Schunk, 1995). In contrast to pupils who doubt their ability, pupils who have confidence overcome difficulties with greater ease and reach a better level of learning, so that they can cope successfully with problems and find solutions.

Schunk and Pajares (2002) link self-efficacy with a supportive environment such as the family, friends and teachers. Assor (2001) also supports this contention and claims that in many cases the teacher's behaviour also influences the pupil's self-efficacy when they provide the pupils with optimal level challenges (if the challenge is too difficult or too easy the child will not try to cope with it, if it is too easy they may take it seriously while if it is too difficult it may scare them; preferably the challenges should be graded in stages). Similarly, the literature indicates that if the pupils receive oral encouragement from the teachers and the teachers use language and terminology suitable for the level and culture of origin of the pupils (Feitelson, 1952) giving very clear instructions and if there is no competitive atmosphere in the class and positive supportive feedback is provided, then the children's sense of self-efficacy will improve. In the present study the

children expressed their sense of self-efficacy in words: *'that task was fun'*, *'we enjoyed it'*, *'it was just right for us'*.

Lichtinger (2010) stresses the influence of the learning environment on pupils' self-regulation and motivation and among other things found that the relevance of the task, characteristics of the task and the pupils' feelings towards the teacher influenced the pupils' motivation to learn. Cook (2010) found that clickers that enabled respondents to give anonymous answers with a remote control created a comfortable atmosphere in the class that improved motivation to learn.

2.6.3 Autonomy

Autonomy is one of the three needs essential for the creation of the child's motivation. Ryan and Deci (2000b) define autonomy as a person's free choice of activity, an internal need. They emphasise that autonomy is also relatively connected with other needs, for example to the need for a sense of self-efficacy and say that the sense of self-efficacy can only increase motivation if autonomy is also present.

Connell's Self-System Model (Connell, 1991) also relates to autonomy, suggesting that autonomy is an experience of choice, decision, implementation and the entire procedure of the activity, expressed in the relation between the action that the individual performs and that person's personal goals. Autonomy also defines the amount of freedom that the individual has. To support a child's sense of autonomy, the child should be given a choice of relevant explanations and the ability to criticise. Pupils who discern that their teachers support their autonomy manage their studies effectively, thus improving their motivation to learn (Assor, Kaplan & Ruth, 2002). Teachers, parents and the environment are influential elements in the strengthening of a pupil's internal motivation.

2.6.4 Summary

Studies show that it is important to be aware of the issue of motivation, and that parents, teachers and other significant adults play an important part in the reinforcement of pupils' motivation, and intrinsic motivation influences levels of

achievement and the pupils' sense of efficacy, the issue of motivation should therefore be considered as an important element of teacher-training courses.

Pupils who began their activity with intrinsic motivation and encounter a difficult task will choose to tackle the issue and find alternative ways to perform the task, while pupils whose motivation was extrinsic will choose denial or diminishment of the value of the activity and/or projection and /or their anxiety will increase. Ames (1990) found that pupils with intrinsic motivation had a greater inclination to perform challenging tasks while pupils with extrinsic motivation tended to be satisfied to perform less complex and less challenging tasks. Pupils with extrinsic motivation were only willing to invest minimal efforts in the educational task, which was not clearly sustained over time. Intrinsic motivation is especially important when the learning requires analysis and synthesis, also in the application of new concepts (Deci, Ryan & Williams, 1996).

It is possible to initially encourage intrinsic motivation by engendering extrinsic motivation (Deci & Ryan, 1985) as the Ancient Sages of Israel said: *'Man has always studied Torah* [knowledge] *not for its own sake*, [solely for its intellectual value] *but as a result, study for its own sake* [for its intrinsic value] *ensues*' (Sanhedrin, 95:b). In other words even if a person has no motivation to become interested in a particular matter, when that person begins to perform it then, over time, intrinsic motivation to perform that matter is engendered. In other words, extrinsic motivation becomes intrinsic motivation.

CHAPTER 3:
RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

The study aimed to examine whether lessons that combine different teaching styles (Visual, Auditory, Reading/writing and Kinaesthetic) hinder or assist the learning of primary school pupils with different personal learning styles, according to the pupils' responses. This was achieved by investigating which of the perceptive elements of the teaching styles were experienced by the pupils as assisting their understanding and mastery of the studied learning material, their concentration abilities, memory and motivation in relation to their own specific learning style, attempting to determine whether certain elements were experienced as facilitating these processes, or if there were elements, which were experienced as hindering these processes because they were ineffective or superfluous or distracting. The study examined this issue in the context where the events took place: in the classroom of an Israeli primary school.

The chapter begins with a description of the constructivist paradigm, chosen for this research. Subsequently the chapter explains the reasons for the adoption of the qualitative research methodology (which nevertheless also included the use of quantitative tools), together with a description of the methodological considerations that influenced the study design. The selected research methods are discussed, specifically a case study employing ethnographic and different phenomenological methods.

The pupils' learning styles were identified according to the VARK test (in the form of a Hebrew questionnaire) fortified by the teachers' and children's opinions regarding the pupils' learning styles. This process is described in detail in Section 3.7.2 Pre-Research Preparations.

The research tools, such as observations, interviews and questionnaires are described and justified, as is the use of triangulation with data from quantitative tools to reinforce and support the validity of the qualitative findings. Issues involved in data collection, such as choosing the sample, data collection and processing, are presented and discussed.

A major part of this chapter will describe and justify the data analysis.

3.2 Paradigm

Kuhn (1962) suggested the term ‘paradigm’ to indicate a scientific tradition whose methodological and theoretical assumptions are accepted by the researchers in the field. According to Kuhn, paradigms could change when science finds itself unable to offer explanations for new phenomena, depending on prevailing worldviews, not necessarily on pure scientific considerations.

Bogdan and Biklen (1982) maintain that a paradigm constitutes the researcher's way of looking at the world, reflecting their assumptions about what is important. In their view (ibid), good researchers are those who are aware of their theoretical basis and employ it to collect and analyse data.

A paradigm explains phenomena in a general way, simplifying them and ignoring specific details (Lincoln & Guba 1985, Guba & Lincoln 1989). Guba and Lincoln (1989) defined a paradigm as a set of basic beliefs that defines a viewpoint and a general approach to phenomena. A research paradigm reflects extensive interrelated assumptions regarding the nature of the researched reality. The paradigm provides the broadest possible framework in which the research can take place (Maykut & Morehouse 1994).

Researchers who were interested in understanding how to study phenomena ask the following paradigmatic questions (Lincoln & Guba, 1985, Denzin & Lincoln, 1994, Sciarra, 1999):

1. What is a social reality? – An ontological question.
2. How can reality be known? – An epistemological question.
3. What are the ways (techniques, tool) to find knowledge? – A methodological question (Shkedi 2003, 24).

There are two main approaches to research, the positivist approach that leads to quantitative research, and the constructivist approach, which serves as a basis for qualitative research. The positivist paradigm maintains that a single actual reality exists, which can be described accurately, while the constructivist paradigm assumes that there are multiple realities that do not follow the simplistic rules of cause and effect (Guba & Lincoln 1989, 86). The constructivist paradigm approaches a study's different phenomena as though they were inseparable, inter-

related entities, so that constructivist research attempts to maintain a holistic view of the studied phenomenon, within its context, in order to offer a reliable and true explanation (Maykut & Morehouse 1994).

Bruner (2000) claims that social reality is a very complex system and narrative description can reflect this reality better than a positivist analysis. In the present work, the researcher's paradigm is based on her ardent belief that reality comprises a variety of behaviours. Every child has their own particular behaviours and characteristics and represents a complete and different world. Since the present study deals with pupils and education, the researcher found the constructivist approach suitable for the present study.

The study does not make assumptions about the researched reality, but presents open questions and speculates about their answers. The study intends to set both the problem and the discussion about it within the context of broader areas of knowledge. There were no predetermined research hypotheses; rather the study stems from the research questions. The study produced rich and robust reinforced findings, which were then supported and examined, enabling the researcher to interpret the findings and indicate differences.

Epistemology relates to the relation between the researchers and the phenomena that they investigate. While the positivistic approach claims that the researcher can hold an objective position towards the phenomena, and perceives the subjective viewpoint as inaccurate and temporal, the constructivist approach assumes that it is impossible to separate the researcher from the researched phenomena and that an interaction exists between them, which itself affects the studied phenomenon and the way in which it is understood, claiming that taking a subjective position is essential to understanding (Guba & Lincoln, 1989, 1998; Stake, 1995; Lincoln & Guba, 2000; Charmaz, 2000).

The qualitative-constructivist researcher strives to understand the phenomena as they are understood by the people experiencing them. The epistemological view of qualitative research also takes into consideration the values of the research participants, that is, those of the researcher as well as those of the study subjects, and considers these values are relevant in order to understand the researched phenomena. While positivist researchers strive toward a ‘value-free’ research

study, constructivist-qualitative researchers will examine how values influence the study (Jorgensen 1989, Seidel & Kelle 1995).

The choice of research methodology was influenced by the chosen ontology and research epistemology (Guba & Lincoln 1989), as discussed above.

3.3 Mixed Methods

As noted, there is a difference in the fundamental perceptions of qualitative and quantitative research, that is expressed in the research tools and data analysis methods chosen for the research work. In recent years there has been growing interest in the possibility of mixing methods from both schools of thought. This mix may include the use of qualitative tools within a quantitative research or alternatively quantitative tools may be employed in a qualitative study (Shlasky & Alpert, 2007). The present study adopted qualitative methodology, yet it also included the use of quantitative tools to assist, provide feedback and reinforcement for the qualitative research.

Miles and Huberman (1984, see also Huberman & Miles, 1994) suggested a mix of qualitative and quantitative research methods. According to Shkedi (2003) the use of quantitative methods within a qualitative research can be useful since they enable a quantitative description of the findings which can sometimes be more illuminating than a thousand words.

Creswell and Plano Clark (2007, p.5) define mixed methods research in the following way:

> *As a method, it focuses on collecting, analyzing and mixing both quantitative and qualitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone.*

Creswell & Plano Clark (2007) suggested several models for a mixed method research procedure:

1. When quantitative methods are embedded within a qualitative study and the researcher provides meaning based on the qualitative research.
2. An explanatory design where data collected with quantitative tools are used to explain the qualitative research findings.
3. An exploratory design, where in order to construct a quantitative tool information is first gathered with the help of qualitative data. For example to build a questionnaire, observations of the phenomenon are first conducted and the observation data are used to construct the questionnaire items.
4. A Visual model of the mixed methods used in the study. In the present study a Visual model of the mixed methods was constructed relying on the above model of Creswell and Plano Clark (ibid).

The researcher aimed to gain insights concerning the studied reality by conducting a longitudinal study, including observations over a period of one year and interviews with pupils. The research attempted to diagnose the pupils' different learning styles. Then the process that they underwent as they participated in lessons that combined different learning styles (Visual, Auditory, Reading/Writing and Kinaesthetic) was recorded over a period of one academic year, and at the end of the year the research examined how the pupils with different learning styles reacted to these lessons as reported by them and as the researcher saw them in her observations of the lessons.

In order to understand the studied phenomenon the researcher attempted to capture and record the events and experiences during the lessons and to observe the studied phenomenon in depth, reconstructing the reality from the details that she recorded. This enabled the researcher to faithfully represent this reality and convey a rich and comprehensive picture to the reader of this thesis, including insights that the researcher had gained regarding the phenomenon. Since the meaning of the phenomenon depends upon the observer, their personal experience and the culture from which they originate, the researcher in the present study tried not to ignore this fact and to exploit it for the benefit of her understanding of the phenomenon.

3.4 Qualitative Research Methodologies

The present study used a qualitative methodology, characterised by the following qualities, as they were expressed in the study:

- Observation was the main research tool. The researcher personally observed the pupils, sat in the classroom and documented the words, occurrences and teacher-pupil interactions and pupil-pupil interactions, and listened to them.
- In an effort to learn about their world, the researcher's focus in the interviews concentrated on the pupils: how they thought they learned, what learning styles existed, and how they felt about their learning through the 'interactive' lesson? She also noted details of the teaching process that employed multiple learning styles and the pupils' functioning during the research period.
- At the end of the year the researcher distributed questionnaires to the pupils (see Appendix 3.4).
- There was no control group nor was there a comparative study. This was an in-depth case study which intended to create a rich picture of the case itself without purporting to generalise (this issue is discussed further in Section 9.2 Critique and Limitations of the Research) but the reportage focused on creating a full and accurate representation of the processes taking place in the studied lessons (Patton, 1980).
- Although the study took place in the library (when it was not used for other purposes) and not in their regular classrooms, it nonetheless can be said that it was conducted in both the subjects' and the phenomenon's natural context, since it took place in the pre-planned grammar lessons, with the same teachers and pupils as participated in the regular grammar lessons. This strategy is in line with the opinions of Rist (1982) and Lincoln and Guba (1985) that qualitative study should be conducted in the phenomenon's natural context.
- Bogdan and Biklen (1982) suggest that qualitative research should be descriptive. Indeed, the present study provides a rich detailed description of the researched processes and the pupils' perceptions.

3.5 Qualitative Methodology Research Methods chosen for this Study

3.5.1. The case study

Case study is an accepted method of research in the field of education. A case study was chosen for this research, because the researcher wanted to gain an in-depth understanding of a particular case (Stake, 1994). Sometimes, a case study is considered a research methodology in its own right (Patton, 1990); while Guba and Lincoln (1981) consider that the case study provides a framework within which knowledge can be elicited out of a 'case', the contents of this knowledge being determined by the research goal and research questions.

Stake (1994) indicated that case study is not a choice of methodology, but a choice of research object. The 'case' to be studied is defined by interest in particular cases, not by the research method used. Yin (1989) suggests that a case study can employ a variety of research methods. Thus, it is not a method in itself, but an approach that combines multiple methods. According to Yin (ibid) a case study explores a phenomenon in the context of the participants' daily life and may consist, for example, of: a teacher, a child, a hospital department, a classroom or community, while the boundaries are only partially defined.

Researchers can use different techniques from different approaches (qualitative and quantitative) to collect and analyse data from a case study; however, 'observation' constitutes the heart of every case study (Cohen, Manion & Morrison, 1989).

Although the concept of a case study is defined by different researchers in different ways, it can be assumed that it is possible to learn much about human behaviour from a case study and to learn about the process taking place in the case under study: case study is an observation on human action in a certain place and time (Stake, 1994, 2000).

The present case study was chosen because of needs that were identified in the field as a result of the observation of lessons, subsequent speculations and questions asked in the field. In the study, the researcher observed the on-going lessons in grammar together with the teachers who taught the lessons, and as a

result of their findings they raised the following questions as possible research questions that would be explored in the case study:

- How are lessons that combine multiple learning styles accepted by pupils with different learning styles?
- Will these lessons be accepted by the pupils?
- Will they interfere with their learning?
- Will the lessons be perceived as a unique experience in a subject that is considered by them to be important but boring?

These preliminary questions defined the gap in knowledge that motivated the development of the interactive presentations and indicated that it was necessary to listen to the 'voice' of the case: to observe the participants' faces, to record the experiences involved in the experimental lessons, and to try to explain it.

In the view of Lincoln and Stake (1990) any case study is a construction, the product of an interaction between the respondents, the place and the researcher. This construction is inherent in the human being's character, experience, context, and philosophy. The researchers have a duty to conduct self-examination and self-exploration, challenging and criticising themselves. Any case study should reflect these personal processes.

In Stake's opinion (1995), the way in which the case is chosen is important. Not every situation or event constitutes a 'case', and not every case can be turned into a 'case study'. The most important criterion, in his opinion, is the extent to which the case can add knowledge concerning the studied phenomenon. This is the underlying rationale for the sample selection by the researcher, unlike a quantitative study, where the sample is randomly selected. Since the researched case was a unique experience, taking place in a certain time and place (The G. School, 2004-2005) not yet investigated, it seems to the researcher that it can be classified as a descriptive case study, and that specific conclusions can be drawn from it.

The studied school and the three classes that participated in the research were selected because the researcher was well acquainted with the classes, and the teacher who teaches in this class is a colleague of the researcher; the two of them work in close co-operation.

Stake (1994) identified three types of case study:

1. Internal: the goal of internal case study is an in-depth study of a case.
2. Collective: collective case study relates to multiple cases and searches for common and more general characteristics, at the expense of intensive inquiry of each case.
3. Instrumental: instrumental case study is designed to attain an understanding of a certain subject through a case, but is not designed for generalisations.

As noted with regard to qualitative research in general, in case study research, there is no consensus regarding the generalisations that can be drawn from a case study. Stake (1994) asserts that each case study is unique and does not lend itself to generalisations, while Shulman (1981) suggests that a case study may contain content useful for generalisation to similar cases, although the actual findings of a case study are only of marginal importance since what is more important is the contribution that they provide for a rich description and in-depth understanding of the particular case. According to Yin (1989) it is possible to generalise from case studies, but only if they are quantitative case studies. While Denzin and Lincoln (1994) indicate that generalisations may or may not be possible, depending on the uniqueness of the case.

This case study could be best described as 'instrumental', according to Stake's (1994) classification. It is designed so that the case study will increase understanding of the researched phenomenon without undertaking any obligation to generalise: the specific findings regarding certain pupils are secondary in importance, serving only as a tool for better and deeper understanding of lessons that combine different learning styles (Visual, Auditory, Reading/writing and Kinaesthetic) and how these lessons influence the learning process of pupils with different preferred learning styles. The emphasis is on the pupils and on the way that they accept learning with multiple learning styles, based on their own preferred learning style, trying to understand this phenomenon in the particular

circumstances of the given case. The reader is invited to discover whether the conclusions of the present research are useful for their own circumstances, although the researcher makes no claims that the conclusions are relevant for similar situations.

3.5.2 The ethnographic method in qualitative research

In a qualitative ethnographic study, the researchers focus mainly on observations, on what they heard and saw in the research field, drawing conclusions and gaining insight from people's words, their behaviour and the objects that they use (Patton, 1980, Stake 1995). According to Creswell (1998), this research strategy employs theory before raising questions and collecting data. Ethnographic researchers view their research from a broad cultural viewpoint, while trying to understand the meaning of the specific culture they want to investigate.

The present researcher chose this strategy mainly because she wanted to learn about the behaviour of the group of pupils in class during lessons that combined multiple learning styles, and to investigate how the pupils' experienced these lessons while taking into consideration each pupil's preferred learning style, according to the pupils' responses in interviews and as recorded in the researcher's observation reports. The researcher attempted to describe their behaviour during the experiemental lessons in detail in her observation records, through in-depth observation of the pupil-pupil and pupil-teacher interactions, observing their body language, how they sat, and the activities that occupied them, and the interaction between pupils and between pupils and the teacher, thus attempting to reach deep insights about the researched phenomenon.

3.5.3 The phenomenological method in qualitative study

Bogdan and Biklen (1982) consider the phenomenological method as an attempt to understand human behaviour, based on a humanist approach. The phenomenological approach assumes that there is no objective truth and that each person understands what they observe in their own unique way and it strives to learn what the participants think and not what the facts are. The phenomenological

researcher is not looking for causal explanations for behavioural phenomena and patterns, but for meanings (Geertz, 1973).

The present research is a phenomenological study since the researcher observes and interprets the studied phenomena according to her own specific viewpoint and understanding. This method is used to examine the meaning that a person attaches to an event; because, as noted, the phenomenological approach assumes that each event has several meanings and that there are several ways in which to interpret it. There is also a social element at play here: the meaning that has been developed by people concerning the events through the interaction between them; the meaning that has been given to the event constitutes the observers' reality, regardless of the event's qualities.

Sabar (2001), Manen (1990) and Creswell (1998) all view phenomenology as a method that explores phenomena as these are perceived by the participants, with the main research tool being the interview. Phenomenological research is not totally naturalistic, because the interviewers influence the participants and influence the way in which they describe their perceptions. The use of observations and other data-collecting tools is secondary, and intended to supplement the interview data (Creswell, 1998; Maykut & Morehouse, 1994; Shkedi, 2003).

This study combines aspects of both ethnographic and phenomenological research approaches. It has ethnographic aspects because it uses observations to understand how the combination of learning styles assisted or hindered the learning of pupils with particular preferred learning styles, and also interviews to understand the pupil's point of view. It provides a moral framework since it interprets the data according to models taken from the domain of the social sciences relating to the value systems of human society. This study therefore used three research methods: observations, interviews and a questionnaire, with the observations being the main method.

3.5.4 Mixed methods

As was noted above, a difference exists between qualitative and quantitative research, beginning with the basic perception and influencing the choice of data-collecting tools and data analysis. However, in recent years there has been increasing interest in combining quantitative and qualitative methods; either combining quantitative tools with qualitative research or combining qualitative tools with quantitative research (Shlasky & Alpert, 2007).

The present research adopted a guiding qualitative methodology, but included the use of a quantitative instrument that helped to provide feedback and reinforcement for the qualitative research.

Miles and Huberman (1984) and Huberman and Miles (1994) suggested combining qualitative and quantitative methods. According to Shkedi (2003), using quantitative methods in qualitative research work could be effective when a quantitative description of the findings is desired. In his opinion, quantitative data can sometimes provide a picture that describes the researched phenomenon better than a thousand words.

Creswell and Plano Clark (2007) suggested several models for the employment of mixed-methods research:

1. The quantitative methods are embedded in the qualitative research, and the researcher provides an interpretation that is based on qualitative research.
2. Explanatory design: to explain the qualitative study, data are collected with the help of quantitative tools as well.
3. Exploratory design: in order to develop a quantitative tool, data is collected with qualitative tools. For example, in order to develop a questionnaire, we observe first and then develop the questionnaire according to what was seen in the observation.
4. A Visual model of the mixed-methods procedures used in the study. In this study.

The present researcher developed a Visual model of the mixed-methods process based on the above-mentioned model of Creswell & Plano Clark (ibid).

The researcher intended to reach insights about the researched reality by conducting a longitudinal study, through observations conducted over two years, and by holding interviews with teachers and pupils. Using these tools, she was able to record the reactions of of pupils with different learning styles, and the processes that they experienced during one school year, when they participated in lessons that combined multiple learning styles (Visual, Auditory, Reading/writing and Kinaesthetic), in order to understand how pupils with different learning styles reacted to these lessons. During the observations, the researcher described the occurrences and the experiences in the researched lessons, observing the phenomenon in depth. The researcher's observations were corroborated and supplemented by the pupils' own oral reactions recorded in interviews. This enabled the researcher to provide the reader of this thesis with a comprehensive and complex picture of the classroom and the events that occurred during the experimental lessons elaborated with the researcher's interpretations and insights about the studied phenomenon. Obviously, the meaning given to the phenomenon also depends to some extent on the observer's perspective, personal experience, and culture. The researcher endeavoured to take this factor into consideration.

3.6 Research Tools

3.6.1 Observations

Observations were used to collect data from live situations, and not indirectly through interviews (Patton, 1990). Since the researcher wanted to examine how pupils with different learning styles experienced lessons that combined multiple learning styles, it was therefore necessary to diagnose the pupils' preferred learning styles before the research began (see Section 3.7.2) and this information concerning their diagnoses was used in the observations as detailed below.

3.6.1.1 Different Types of Observation

Shkedi (2003) suggests the following categories of observation:

1. Pure observation: in which the observer is hidden and invisible to the subjects.
2. Involved observation: in which the observer is involved in the happenings in the field: in this case the lessons.

3. Participating observation: in which the observer is also a participant.

In this study, the type of observation employed was situated halfway on the continuum between pure and participant observation, because, the researcher sat in the classroom, in the left corner beside a group of pupils, observing the pupils. She was not concealed from them, but at the same time she did not participate or interfere in the lesson. Nonetheless, the pupils knew who she was.

The researcher did everything possible to ensure that the pupils became accustomed to her presence in the classroom, but at the same time the researcher understood that her presence might have some influence on the pupils.

3.6.2 The interviews

The interview is an initiative by the researcher used to talk to the research participants, the researcher's purpose being the acquisition of relevant information for the study and the conversation focuses on subjects defined by the research objectives (Cannel & Kahn 1968).

Interviews are classified in the following manner:

1. Formal (or structured) interviews: the interview includes a series of questions and the interviewee is supposed to answer only these questions.
2. Open interviews: the open interview is based on an unstructured conversation without directing the interviewee. This allows the interviewee to tell their story from their point of view without interruption.
3. Semi-structured interviews: this type of interview is somewhat similar to the open interview but it includes pre-determined subjects that the researcher wants to cover. At times, the researcher can intervene and ask questions in order to gain a better understanding of the subject and acquire in-depth information (Seidman, 1991; Shkedi, 2003).

The researcher chose to use semi-structured interviews, since on the one hand she wanted to be attentive to the pupils and hear what they had to say, while on the other hand she needed to point their attention to and hear their views, attitudes, preferences, evaluations, approaches and beliefs regarding some of the study topics. The pupils seemed pleased to describe their learning experience in

the 'interactive' lessons. They understood that the researcher wanted to hear what they had to say about the 'interactive' lessons, and they perceived the interview as a summary of the experience. Recording the pupils' interviews on the tape recorder released the researcher from the need to write down information, and helped her to focus on listening to the interviewees. Later, each recording was transcribed in full to allow the researcher to analyse what had been said during the interviews (see the Section 3.8: Ethics).

One pitfall associated with interviews, known as the Hawthorne Effect (Rosenthal and Jacobson 1968), relates to the possibility that pupils may develop their own thoughts about what the interviewer, would like to hear and they may adapt their responses accordingly, in an attempt to please the interviewer. Additionally, a pupil may suspect that the interviewer will pass on some of their impressions concerning the pupil to the teacher and that may somehow affect the teacher's opinion about the pupil. Such suspicion may also affect how the pupils respond: it may have motivated the pupils to overlook problems and difficulties and to emphasise success and achievements. The researcher made a special effort to convince the pupils that they should not worry about this as she would not use the information that they gave her outside the research and clarified that she wanted them to provide responses that were as authentic as possible

The interviews also served as a source of tacit knowledge that was not expressed explicitly in words but could be deduced from the interaction with the pupils and by observing the context (Polanyi, 1967; Lincoln & Guba, 1985; Merriam & Simpson, 1984). The interview is an important tool that helps to turn implicit into explicit knowledge (Arksey & Knight, 1999).

3.6.3 The Questionnaire

During the research period, the pupils received two questionnaires:

1. The VARK test of Fleming and Mills (1992) was employed (in the form of a Hebrew questionnaire) to diagnose each pupil's preferred learning style (see Section 3.7.2). The questionnaire (see Appendix 3.1) was completed by pupils in the three studied classes at the beginning of the school year (October 2004).

2. At the end of the year (June 2005) a questionnaire (see Appendix 3.4) was completed by the pupils with the different learning styles to examine the extent of hindrance to learning that they experienced when exposed to the experimental lessons using combined teaching styles.

3.6.4 Triangulation

Triangulation serves to re-examine a phenomenon (McNiff, 1994), by comparing data regarding the phenomenon derived from at least three sources in order to validate the study's results. During triangulation, the reliability of each finding and interpretation received from a certain source is checked. However, the goal of triangulation is not to support or refute any hypotheses, or even to generalise the findings. The purpose of triangulation is to develop a richer description of the case study (Denzin, 1970). Since every single method in qualitative research may be limited in one way or another, in its ability to absorb data or because it creates bias, triangulation is required. The use of multiple methods to obtain results increases confidence in the validity of the findings (Cohen, Manion & Morrison, 2001; Smith, 1975).

The researcher related to possible limitations of the data from different instruments which were triangulated in the present study.

- In the **observations**, the researcher attempted to describe regular daily events, not only exceptional ones. However, the researcher was aware of the problem that her attention was attracted to the exceptional pupils. The researcher tried to provide a broad description of the occurrences in the classroom, but since she sometimes conducted the lesson herself, without video recording, it could well be that the researcher did not include all of the occurrences.
- In the **interviews**, the researcher recorded the pupils' words, to allow her to be more attentive to their speech (intonation and mood) and body language and to ask the questions that guided her in this research. Although the researcher recorded the interviews on tape and in writing very carefully, it is possible that some factors were ignored, and therefore triangulation helped the researcher validate the interview findings as far as possible.

- The third side of the triangulation consisted of the **questionnaires**. They contributed to the triangulation by presenting the pupils' points of view from a different direction in a more structured manner.

3.7 The Research Design

The research design included two main phases:

Phase 1: Choice of the primary school and teachers, and implementation of the proposed research approach using a multimedia PowerPoint presentation on grammar for regular lessons over a period of one year.

1. Implementing the specific technique with two teachers at the school.
2. Advising the teachers about how to implement the technique, and what needed to be done with the pupils in the 'interactive' grammar lesson.
3. Gauging the pupil's and teacher's cognitive reactions using the following tools:
    a. A questionnaire for pupils at the end of the school year.
    b. Pupil interviews
    c. Observation of pupils during the specially designed lessons in class over a one year period.

Phase 2

a. Thinking about the ways in which the pupils' diverse learning styles could be diagnosed and observed.
    i. Pre research preparation.
    ii. The pupils responded to a Hebrew version of the VARK test of Fleming and Mills(1992) to classify the kind of learning style of each pupil (see below 3.7.1).

b. Weekly observation over one year of three classes (E1, E2 and F) with 20, 23, and 29 pupils respectively: two of these being classes with 11-year-old pupils and one a class with 12 year-old pupils.

c. Continuing with class observations over one additional year.

d. Questionnaires to ascertain what the pupils thought about their learning during the 'interactive' lesson and whether the lesson assisted them to understand the grammar or hindered their learning? Their ability to understand, master and memorise the subject matter was marked by the pupils on a scale from 1 to 5.

3.7.1 The explanation given to the pupils and the definition of the pupils' learning styles

At the beginning of the study the researcher provided the pupils with a detailed explanation concerning the different learning styles (see Section 3.7.2 Pre-Research Preparations)

She explained the research goal and told the pupils that the assignments, observations, interviews and tests involved in the research would only be used by the researcher and only for research purposes and not for any other purpose. She also explained that she was not going to use their real names in the study, but only the first letters of their name and surname.

3.7.2 Pre-Research Preparations

Introduction

In order to perform the research the researcher decided to use the VARK test to identify the pupil's individual learning styles. For this purpose the VARK test was translated into Hebrew (see Appendix 3.1).

The VARK test was created by Fleming and Mills (1992), based on the belief that pupils have different preferences regarding the manner in which they receive and process information. There are those who learn better from Visual forms of information including pictures, sketches and drawings. Others respond better to

verbal channels such as listening to voices and tones. Some respond better when reading or writing while still others learn better when they are doing practical work and construction, for example: cutting, pasting and Kinaesthetic actions (Fleming and Mills, 1992).

Some researchers constructed models of sensory perception although each of theories underlying these models relates slightly differently to the link between perception by the senses and the definition of learning styles (Barbe et al., 1979; Richardson, 1984, Dunne and Dunne, 1990; Felder, 2002) as explained in Chapter 2: Theoretical Perspectives. Sensory learning style theory stemmed from the assumptions of Stirling (1987) that there are three main categories of sensory intake of information: Visual, Auditoryaural (Auditory) and Kinaesthetic.

Fleming and Mills (1992) decided to dub the pupil's learning style as 'V' – Visual – if they preferred learning with graphs, pictures and symbols so that the Visual learning style included a preference for information expressed through graphical representation and symbols and also a preference expressed in the printed words. Respectively, the 'A' - Auditory(Aural) learning style was given to pupils who preferred to study through their hearing, listening to voices, tapes etc., while the 'K' Kinaesthetic style referred to pupils who preferred learning through practical activities. Later it was realised that there were also pupils who preferred to learn through 'R': Reading and writing, this was derived from the Visual element since the Visual element included a preference for information expressed in graphics and symbols, while the Reading/writing element included a preference for reading and writing printed words (Fleming and Mills, 1992).

Fleming and Mills (1992) developed a questionnaire for university students and demonstrated that explaining the results of the questionnaire to the students, helped the students to understand how they used their senses to absorb their learning and thus enabled them to make a conscious choice between different ways of learning. Rogers conducted a similar study in 2009 with medical students, examining whether the fact that students were informed about their learning style and taught according to their preferred learning style would improve their learning. She also investigated differences in preferred learning styles by gender and found that male students preferred Visual and Kinaesthetic learning styles while female students preferred Reading/writing. Most of the participants reported a positive

change in their academic performances during the semester of the research. Many of them reported that they had received a better grade than usual in their mid-term examination (Rogers, 2009). Similarly Baykan and Nacaz (2007) found that when students understood their learning style (tested according to the VARK test) they were able to learn more effectively.

The VARK test (Fleming and Mills (1992)) has been used since 2001 and is freely available online at: http://www.vark-learn.com/english/page.asp?p=questionnaire, for school and individual studies, as long as use is restricted to non-profit purposes. The test is designed in two versions for a younger population, aged 12-18, and for adults and has been translated into 29 languages. The questions examine learners' learning preferences, and this easily accessible questionnaire has enabled the wider public, both children and adults (two different tests) to examine their preferred learning styles. The friendly test on the Internet with questions based on real-life situations that are easy to understand and use, enables the respondent to choose more than one answer so that it also allows respondents to know whether they use more than one learning style. The respondent receives the results of the test immediately on-line and can ask the questionnaire's developers questions and receive the answers on-line. The test has been published internationally in many languages and thousands of studies have tested its application and efficacy, examining learning styles by gender and by discipline and as noted above, whether the learners' knowledge of their learning style improves their learning (Baykan and Nacaz, 2007; Rogers, 2009; Ronberge et al., 2011).

The test contains 13 questions (see Hebrew translation of questionnaire in Appendix 3.1), each with four possible answers, each of which represents a particular learning style element and respondents may mark more than one answer as appropriate. The test has been improved since 2004, and was validated by Leite et al (2010) who concluded that the assessed correlates were adequate, providing initial support for VARK score validity.

Methodology

At the time that the research was conducted the VARK test had not yet been validated. Since the questionnaire provides several possible answers it was difficult to perform analysis of its factorability and reliability. However it is noted that since the research was completed, Leite et al. (2010) validated the test.

Even before this validation, Fleming asked respondents who completed his on-line test to mark whether the results they received were appropriate for them. Since there was a high degree of correlation, it was clear that the test had internal validation but no prediction validity that would be useful for pupils and their teachers (Wehrwein et al., 2007). For this reason in the present study, the researcher performed several procedures. After the teachers received a detailed explanation concerning the issue of learning styles, including reading material then the VARK questionnaire was accurately translated from English to Hebrew and examined and criticised for its appropriateness by two Class Teachers. The teachers affirmed that the test was readable, easy to understand and that the questions' subject matter was appropriate for the daily life of their pupils and reflected the explanations of the different learning styles.

The researcher decided to investigate whether there was a correlation between the perceptions of the teachers and of the pupils themselves concerning the pupils' learning styles and the pupils' diagnoses according to the VARK test.

This was performed by asking the pupils what they thought their learning style was and asking the teachers to report what they thought the learning style of each pupil was. For this purpose the author explained the test and learning styles to the teachers and pupils in the first class according to the following procedure.

- The researcher thought about the main points which it would be important to explain to the pupils and teachers:
    - A learning style is personal.
    - No single style is more important, recommended or correct than any other. Each person has their own best way to absorb information.

- One pupil may have several different elements in their learning style and this is perfectly alright, it just shows the way in which the pupil prefers to absorb the studied subject matter.
- Pupils were assured that the results of the tests would not be given to the teachers, parents or school management but would only be viewed by the researcher and no use would be made of this information except for the research, and that names of the pupils would only be mentioned in the research by their initials so that it would not be possible to identify them.
- In order to compare the VARK test results with the teachers' diagnoses of the pupils' learning styles, the pupils would be asked to write something about their learning preferences for learning but would not be asked to add the English letters VARK (see Appendix 3.2, Table 3.1). The researcher would examine their writing after the lesson and write the appropriate letters signifying their style by analysing their remarks according to the criteria she had previously prepared for this issue (see Appendix 3.3: Table 3.2).
- The pupils only received the results of the VARK test one week later so that their written remarks were not influenced by the test results.
- The pupils would not be told that the teachers would also tell the researcher what they thought were the pupils preferred learning styles; this was in order not to put pressure on the children and not to put additional emphasis on the matter.

<u>The way in which these matters were explained to the pupils</u>:

- The researcher decided (due to her experience in the field over 31 years) to explain these matters in a language and at a level that was fitting for the pupils, and so she presented examples of the different learning styles to them in an interactive multimedia presentation.
- The researcher gave information pages to the teachers before beginning the explanation procedure and before conducting the VARK test and asked them for their opinions concerning the explanation as the professional educators. The teachers suggested adding metaphors representing matters

close to the children's daily lives for example *'something similar to the VARK preference for example that one pupil prefers to drink milk while another prefers to drink water, and this does not change the value of the person because they have a certain preference'*.

- The researcher explained the issue to the pupils and the teachers in one class. The researcher asked if they had any questions, and clarified her explanations according to the questions that were asked. In the second hour when the researcher again explained the same matters in the second class she introduced alterations in her explanations in line with the questions that she had been asked in the previous class so that in the second class no further questions were asked by teachers or pupils.
- The same lesson with the explanation and examination also took place in the third class.
- The researcher asked the pupils to think what their learning style was and to write down several words explaining how they could best absorb the subject matter: by seeing the things visually in pictures or pictorial animations, by reading the subject matter in a text, by writing it down, by hearing it explained or by experiencing it in practice. Each pupil wrote a few lines explaining how they preferred to learn.
- Based on their familiarity with each pupil in the class, the teachers were asked to give their personal assessments of the learning styles of the pupils (see Appendix 3.2).

As noted, all these activities took place before the pupils received the results of their VARK tests.

- The researcher collected all the data and analysed the data according to the criteria that she had prepared in Table 3.2 (Appendix 3.3) she marked each pupil's learning style on the pages on which the pupils had explained their preferences.

This examination aimed to compare the pupils' VARK test results with the teachers' opinions and the pupils' own testimony (see Appendix 3.2).

Results

As mentioned, learning style assessment using the VARK tool includes up to four dimensions that define the child's learning style – V, A, R and K, or any combination of these dimensions. However, when defining their learning style, children and teachers tended mostly to relate to a single learning style. In view of this fact, the criterion for agreement between the diagnosis and the child's/teacher's perception was defined as compatibility on at least one aspect of the overall learning style assessed by the tool.

The children's perception of their learning style was in accord with the VARK diagnoses for 61 children (85.9%) and incompatible with the diagnosis results for 10 children (14.1%). This agreement is not significantly different from 90% agreement, considered high ($t(70)=0.98$, ns). The difference between the present degree of compatibility and that of the value of 90% was tested using t-tests for a single sample with the critical value set at 90%

The teacher's perception of the children's learning style was in accord with the VARK assessment results for 60 children (84.5%) and incompatible for 11 children (15.5%). This agreement is not significantly different from 90% agreement, considered high ($t(70)=1.27$, ns). The difference between the present degree of compatibility and that of the value of 90% was tested using t-test for a single sample with the critical value set at 90%.

It was concluded that assessment of learning styles using the VARK assessment tool did not differ substantially from the child's/teacher's perception of their learning styles, at least with regard to one element of the style.

The incompatible cases were as follows, where VARK assessment results included

- V in 4 cases, but not so in the child's/teacher's perception.
- A in 6 cases, but this was not so in the child's/teacher's perception.
- R in 9 cases, but this was not so in the child's/teacher's perception.
- K in 6 cases, but this was not so in the child's/teacher's perception.

On the other hand, the child's/teacher's perception included:

- V in 3 cases that did not appear in their VARK assessment
- A in 5 cases that did not appear in their VARK assessment
- R in 5 cases that did not appear in their VARK assessment
- K in 7 cases that did not appear in their VARK assessment.

In addition to this test, the measure of compatibility was also examined for the various learning style components: i.e. compatibility was defined as the rate of agreement between the child's/teacher's perception and the number of components included in the learning style assessment. For example,

- if the child's learning style was assessed as VA and the child/teacher described it as V, the compatibility score is 0.5.
- If the child's learning style was assessed as KVA and the child/teacher described it as AV, the compatibility score is 0.67.
- If the child's learning style was assessed as KRVA and the child/teacher described it as RK, the compatibility score is 0.5.

According to this stricter criterion, the average compatibility level between assessment and the child's perception is 0.48 (Sd=0.34) while the average compatibility rate between assessment and the teacher's perception is 0.45 (Sd=0.33). Therefore, the average compatibility rate is close to 50%, and is not significantly different from 50%, considered a medium level of compatibility betweeen the child's perception ($t(70) = 0.56$,ns) and the teacher's perception ($t(70)= 1.25$,ns). The difference between the current compatibility measure and the compatibility measure for the value of 50% was tested using two t-tests on a single sample with the critical value defined as 50%.

Discussion

When asked why he did not prepare a questionnaire to determine the learning styles of young pupils, Gregorc (2002) claimed that it is impossible to obtain responses from young pupils since they provide answers in order to please their teachers or get bored answering a large number of questions and randomly mark

their answers. The researcher took this to heart, in this research the pupils were aged 11-12 at the time that they answered the VARK test and according to the researcher's request, the pupils described what they thought was their style in their own words. The researcher showed the Class Teachers the questions on the VARK questionnaire, translated into simple Hebrew, in order to check with them that they were appropriate and understandable for the children according to their age. Their teachers testified that the children were used to answering a similar number of questions without any problem and that the questions would be clear to the pupils. To further ensure that this would be so the pupils identified with reading comprehension difficulties (new immigrants, special needs pupils etc.) were helped by an assistant who explained the questions to them.

Additionally there was no room for distortion due to social desirability in relation to the teacher or researcher in the questions since there was nothing in the test or in the question that the researcher asked which could indicate greater importance or value for one answer than for another. The test included 13 questions which for a questionnaire is a relatively small number of questions. The researcher also ensured that there would be no interfering situations that could distract the pupils from the questions during the completion of the test.

In contrast to the opinion of Gregorc, Kozminski (2004) claimed that pupils of elementary school age are sufficiently mature to know how to mark suitable answers that reflect what they want to say. In line with this opinion, in most cases children/teachers precisely assessed at least one element of the elements included in the assessed learning style. Their average perception, based on all elements from which the assessed learning style was composed was corroborated on average for half the elements in the children's learning styles. This is not surprising since it is difficult for a pupil to precisely appraise their own learning styles and all their components (see results of pupils' opinions Appendix 3.2) and this fact supports the need for corroboration of the diagnostic tool (the VARK test.

In summary, it seems that the test carried out by the author concerning the compatibility between teachers' and pupils' appraisals and the VARK test supported the author's opinion that the VARK evaluation test is a useful and necessary tool. Moreover, this test was the only one that provided an appropriate assessment tool for the pupils' styles (Visual, Auditory, Reading/writing and

Kinaesthetic) at this age. Today since the VARK test has been validated this reinforces the justification for the use of this test (Leite et al., 2010).

The researcher decided at first to give a tag to each pupil: a green tag – Kinaesthetic, blue tag – Reading/writing, pink tag – Auditory (Aural), yellow tag – Visual (some of the pupils would have a combination of these colours, and the tags would be given following a test examining their learning styles), so that the researcher could observe them and consider their styles at the same time. After much deliberation, the researcher decided not to use the tags, since she did not want to embarrass the pupils and make them think that one style was considered preferable to another. Also, it seemed that a lot of time would have been wasted in attaching the tags, taking them off, and keeping them. Therefore the researcher decided to mark the pupil's learning styles for herself on the observation notes of each observation, to match the style with the pupil and the record concerning their behaviour.

The researcher observed the pupils during the different parts of the 'interactive' lesson. For example, during the use of Visual learning in the 'interactive' lesson, the researcher recorded the pupils' responses and their names. She took notes during the observations and processed them afterwards. Later, she used the observation notes as a tool to produce data that was combined with data from the interviews and the questionnaire.

3.8 Ethics

In a social qualitative study, ethical considerations usually cover four issues (Bryman, 2001):

1. Prevention of damage to the participants
2. Ensuring informed consent
3. Respecting the subjects' privacy and anonymity
4. Preventing fraud

The researcher applied all necessary rules pertaining to ethics which were relevant to the course of the present study. The study was designed so no injury

could occur to the participants as a result of their participation. The interviews which were conducted had no ill effects on the participants.

The idea of tagging the pupils with their learning style was dismissed in order to ensure privacy of information and the pupils' comfort.

The researcher was careful to obtain informed consent from all those involved in this study and so she obtained all the necessary permits from the Ministry of Education, school board, teachers and pupils.

The researcher endeavoured to develop reciprocal trust relations with the pupils. She treated them with respect and attention (Arksey & Knight, 1999). She carefully maintained confidential all the materials, observations, interviews and tests and did not show them to other people in or outside the school. The pupils', teachers' and school names were deleted from the data, and instead, the initial letters of the participants' names were used (Seidman, 1991).

The following is a quotation from the approved research proposal of this researcher:

> *Ethical considerations: As the researcher, I will respect the participating pupils and teachers by treating them with respect, justice, openness and fairness. Their names will remain anonymous to protect them and they will be free to terminate their participation at any time. Written consent will be required from the school, the teacher, the parents and the pupils to interview, observe, quote, and photograph the pupils, and to use their notes as well as the teacher's evaluations and these consent papers will be submitted to the university. I will conduct the study by myself and be responsible for it. The study will comply with the ethical code of Anglia Polytechnic University (2001) according to the relevant subjects in the APU ethical guidelines: Rational and value setting (24), Informed consent (25, 26.1-5), Openness and honesty (27, 29, 30), The right to terminate participation without punishment (31), Secrecy and anonymity (32, 33), Damage prevention (35, 36), Briefing and debriefing (38, 39), The researcher's suitability/experience (41), Ethics rules of external agencies and institutions (42), Proposal amendment (47), Planned distribution (48).*

3.9 Sample selection

3.9.1. A Description of the School chosen for the Research Experiment and the Reasons for its Selection

The school selected for the experiment was the 'G' primary school. The school has approximately 200 pupils, and each age group includes either one or two classes according to the number of pupils in the age group in the school's district; more than 50 pupils justifies double entry so that each age group includes either one or two classes of 25-30 pupils.

The school is located in a neighbourhood with a mixed low socio-economic level population: new immigrants from the former United Soviet Socialist Republics and veteran residents. Some of the school pupils are transported daily to the school from another nearby community, where there has been no regular school for some years. The pupil population includes special education pupils, and the classes are therefore very heterogeneous.

The teaching staff and school management are very amenable to changes and new experiences, continually attempting to improve the education of the school population. For this reason the school co-operated fully with the researcher, and all her requests for assistance were met, including a suitable room for the lessons and for interviews, provision of a projector and central computer.

The researcher decided to conduct the research on primary school pupils in Years 5-6 (ages 11-13). Relying on her personal and professional experience, she considered/hoped that pupils of this age would be able to express themselves clearly in interviews and understand the VARK questionnaire (see Section 3.7.2 Pre-Research Preparations).

The researcher could not find extant research either in Israel or abroad on the use of multimedia in the context of different teaching styles for this age group (most research in this field has focused on older pupils, mainly higher education students as shown above in Section 2.5).

The particular primary school was selected because of the willingness of the principal to co-operate fully with the experiment. As noted, the school also had all the necessary equipment for the study, such as a projector, and provided access

to a suitable computer. There were two Year 5 and one Year 6 classes, which were taught Hebrew grammar by two different teachers and the teachers were willing to participate in this research

3.9.2 A description of the classes selected for the experiment

The following three classes were selected for the experiment:

Class 5a had 23 pupils, 12 girls and 11 boys.

Class 5b had 20 pupils, 7 girls and 13 boys.

Class 6 had 29 pupils, 16 girls and 13 boys.

(The study did not deal with gender differences).

These ethnically and educationally heterogeneous classes, the result of mass immigration to Israel and internal migration within Israel and the inclusion of special education pupils within mainstream classes, often present considerable pedagogical difficulties, especially for effective class management (Minkowitz et al., 1980; Adar et al. 1981; Kashti et al., 1989).

All the pupils in the selected classes participated in the experimental lessons of the research.

3.9.3 The location of the studied class

The study was conducted in the library. This room was selected because it was the only room in school with dark curtains on the windows, allowing clear display of the presentations projected on a large screen dropped over the blackboard. The room was large and comfortable, with wall-to-wall carpeting, and high windows that prevented the pupils from being distracted by looking out to the playground. The library was located at the end of the corridor, far from the noise made by the other classes.

During the lesson, the library did not operate as usual, and the room was vacated for the studied pupils and teachers. When the presentations were projected, the classroom was partially darkened. Four to five pupils sat around each trapeze-shaped desk, facing the blackboard. Under the teacher's desk, located at the front

of the room was a computer and the presentations were projected onto the screen by a projector placed on the table. The projector was also used in other lessons, so that the pupils were accustomed to its use.

The pupils arrived at the library at the appointed time for their grammar lessons. Following the researcher's request, the pupils sat around the tables according to a set order, to allow her to remember the pupils' names and their learning style (see Appendix 7.1: Protocols of Observations of Kinaesthetic Work). The researcher arrived at the lesson with pages on which she had recorded the layout of the desks, the pupils' names according to their seats and their learning style. This method enabled her to identify the pupils by their learning styles and to record the way in which they were affected by the lesson in relation to the events occurring during the lesson, which she also recorded. It is noted that there may have been events during the lesson that escaped the researcher's notice as she was engaged in writing or teaching but she exerted efforts to record maximum possible events.

3.9.4. The teachers selected for the study

The teachers selected for the study were the teachers who taught Hebrew grammar in the classes selected for the study.

The teachers L. and T. taught grammar to the three classes. They were not familiar with the work method but were happy to participate. The researcher gave them all the interactive grammar presentations and explained the work method and the study goals. The researcher enjoyed the full co-operation of both the teachers, pupils, parents and the school management.

3.9.5 The rationale for the choice of the research subject

The subject chosen for the study was Hebrew grammar. This subject was selected because Teacher A, the researcher's colleague, was teaching this subject and she helped the researcher to develop the tools used for the experiment, namely: 'interactive multimedia presentations', (including Visual, Auditory, and Reading/writing presentations).

3.9.6 Emergence of the research issue in observations in the school and development of the main educational tool for the research

A very gradual process was employed to introduce the research in the school and no attempt was made to coerce the teachers to participate. The researcher began to exploit her spare time between lectures in the college where she worked to visit the 'G' primary school and observe the lessons in the Year 6 class, taught by her close colleague A.

A was a very open-minded and creative person and was happy to accommodate the researcher. Together, they thought about improvements that could be made and how to introduce technological innovations into the classroom. A was not only open to changes, but was actually asking for them.

The researcher had the impression that in her friend A's frontal lessons, most of the pupils seemed lethargic (tired) and were not engaged in the lessons. They seemed to be gazing out through the windows at the skies; they were talking between themselves, exchanging games under the table, drawing caricatures and dreaming.

On the basis of these visits and after much deliberation, the researcher discussed these observations with A and decided to conduct a study to examine whether lessons that combine different teaching styles (Visual, Auditory, Reading/writing and Kinaesthetic) hinder or assist the learning of primary school pupils (attention, absorption, mastery and memorization) with different personal learning styles, according to the pupils' responses.

Together with A, the researcher prepared the presentations; A took responsibility for providing the academic content, while the researcher arranged the content in PowerPoint presentations for the computer.

3.9.7 Developing the Educational Tool: Interactive Multimedia Presentations

Thus the goal of the present research as noted above was: to examine whether lessons that combine different teaching styles (Visual, Auditory, Reading/writing and Kinaesthetic) hinder or assist the learning of primary school pupils (attention, absorption, mastery and memorization) with different personal learning styles, according to the pupils' responses.

In order to teach lessons that combined multiple learning styles, the teachers needed a specially devised tool. Since no existing tool could be found that employed all the required learning styles (Visual, Auditory, Reading/ Writing and Kinaesthetic) the researcher decided to construct a special purpose-oriented interactive multimedia presentation for the research lessons, which would be projected from the computer monitor at the teacher's position onto on a large screen on the class blackboard. This presentation was planned to include all the required teaching styles (Visual, Auditory, Reading/ writing and Kinaesthetic). The teacher would continue to conduct a frontal lesson, employing the Auditory aspect to provide an explanation concerning the presentation and would use the presentation itself as the main learning tool for the lesson. In addition, in the last part of the lesson the pupils would participate in Kinaesthetic learning actions.

Since the tool itself was not the object of the researcher's study, the intense process involved in the choice of criteria for the selection of the pictorial animations, pictures, emphases and Auditory sections and feedback within the presentation is not detailed here. It should however be noted that the researcher and Teacher A. invested much thought and care in selecting appropriate learning material for Years 5 and 6, and deciding how best to produce the interactive presentations on Hebrew grammar for the experimental lessons that would be delivered over a period of one entire academic year.

3.9.7.1 Visual Learning

The presentations included a wealth of pictures, for example: a train or an ambulance. The words moved across the screen, with colours for emphasis and pictorial animation, and the same colours were used repetitively for the same subjects. Grammatical rules were summarised in one or two main sentences. These rules were underlined and repeated several times, taking care that they always appeared in the same form and colours.

The graphic display of the presentations did not necessarily enhance the academic value of the studied material but was intended to present the material in a Visual manner. For example a sentence that described a 'monster' was accompanied by a picture of a 'monster'. This was also true for the sounds accompanying the presentation, which were not an integral part of the studied material.

3.9.7.2 Auditory (Aural) learning

Auditory stimuli included sounds such as the siren of an ambulance, repetitive sounds, for example, voices that continually repeated the grammatical rules and the main ideas and the teacher's voice in the discussion with the teacher in class, sound in the computer-pupil interaction and the interaction between the pupils.

3.9.7.3 Learning by reading and writing

The idea was that the teachers would ask the pupils to write the rules in a notebook during the lessons, and pupils would read excerpts from the rules, both aloud and to themselves, so that the Reading/writing learning styles would be included in the lessons.

3.9.7.4 Kinaesthetic learning

At the end of the presentation the pupils revised the material in special workbooks that combined exercises and Kinaesthetic activities such as cutting, colouring, and gluing (see an example of such a work sheet in Appendix 7.1: Protocols of Observations of Kinaesthetic Work).

3.9.8. A description of the presentation

This section describes and explains the presentation's development relating to its Visual, Auditory, and Reading/Writing components, which created Visual, Auditory, reading, writing and Kinaesthetic learning events. The section provides a clear picture of the activity in the classroom during the lesson with the presentation and explains how data was collected during the observation on the lesson. All the presentation texts were written and transmitted in Hebrew, but for the purposes of this thesis they are translated into English.

The goal of the first lesson was to revise material, previously learnt by the pupils in the preceding year as groundwork for the new material. The first presentation began with a review of the previous material, that is, it reiterated the identification of different 'parts of speech' in the Hebrew sentence, for example: 'noun', 'verb'. The academic subject for the year in which the study took place was the function of the different parts of speech in the sentence, for example: subject, object, the main subject and subsidiary subjects and a revision of the sentence parts, punctuation, and Hebrew idioms.

This first presentation displayed two sentences. In each, the same word appeared, but with a different meaning. The sentences appeared on the screen gradually. This presentation was considered for the purpose of this study as a **Visual** event. Next, an interrogative sentence appeared, the question was: 'Which identical words appear in both sentences?' This too was considered as a **Visual** event. The question was directed at the classroom pupils. The teacher or the pupils could read the question aloud. When the pupils read, it was considered as a **Reading** event. Listening to this reading was considered as an **Auditory** event.

The teacher asked one of the pupils to answer the question. All the other pupils in the classroom looked and listened. The pupil's incorrect answer did not always testify to a lack of observation of the display in the presentation but sometimes testified to a lack of prior knowledge. When the pupils wanted to answer which word was the same in both sentences, their knowledge of the correct answer testified to their prior knowledge, which the teacher wanted to use as the foundation for new knowledge. For this reason the pupil's answer was not considered as an event (Visual, Auditory, Reading/ Writing). However, this

response was observed, the pupil's name was written down and whether the pupil gave the right or wrong answer, in case this information would be needed to enrich the data.

After one of the pupils had answered, the teacher reacted by pressing the computer's 'Enter' button, and the two identical words were then coloured in red, for example, the word 'falls' in the following sentences: *Daniel falls from the chair. Niagra Falls is beautiful.* This response by the computer was also considered in this study as a **Visual** event. This process of appearance of the question, responses of the pupils and the teacher, was repeated several times during the lesson.

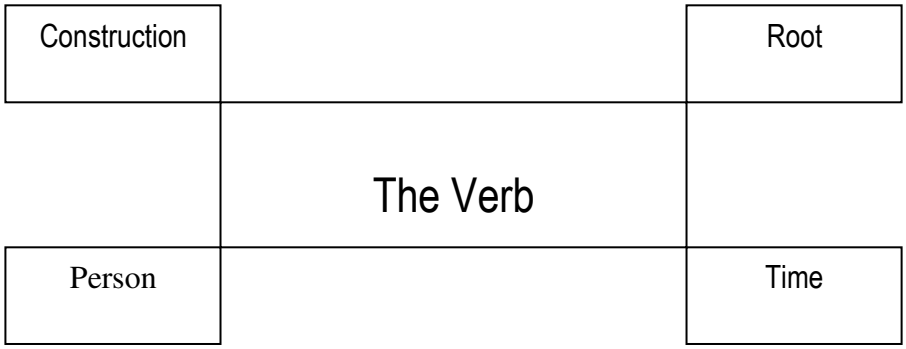
When the pupils answered the question, annotated arrows appeared leading out of the words to explain the parts of speech represented by these two words, this was also considered as a **Visual** event, these words had identical sounds but different meanings (one was a verb and the other a noun). Next the presentation asked the pupils how the two words differed one from the other.

The next part of the presentation related to the different forms of a verb. A word of explanation is necessary regarding Hebrew grammar. Hebrew verbs are conjugated according to specific patterns called *binyaním* - "constructions". To form these constructions vowels and affixes are slotted into the (mostly) three-letter (shorashím - roots) from which the majority of Hebrew words are built. There are seven basic *binyaním*. In addition verbs are conjugated to reflect their tense and mood, as well as to agree with their subjects in gender, number, and person.

A framed verb appeared on the screen, surrounded by four additional frames, in which four forms of the verb were described. Each framed word represented a single form of the verb, Below these frames appeared three conjugated forms of the verb, which were distinguished one from the other by a single component.

All these representations are considered as **Visual** events, (see example in Figure 2.12 below).

Figure 2.12: The Presentation of a Verb



Thus the pupils learned to identify the different forms of the verb. They were then presented with three identical forms of different verbs and one exceptional form and asked to identify which of the forms was exceptional

At first the root was the exceptional form. Following this the exception was the verb's form conjugated according to time. Thus the pupils arrived at the conclusion that the verb has four forms, the root, and its conjugations according to person, time, and structure. Each of the conjugated verbs received a different colour and was animated to move from above to below, moving directly into the appropriate frame. This event was considered as a **Visual** event. This movement was accompanied by musical sounds, considered as an **Auditory** event, since the teacher was also asked by the researcher to sing the verb components with the pupils in a certain rhythm adding melody to the words so that it would sound like a jingle, which could help the **Auditory** learning.

The presentation ended, but in the other presentations, when the rules appeared, the teacher asked one of the pupils to read the rule aloud – this was considered in this study as a **Reading** event. The pupils were also asked to copy the rule into their notebooks, an act that was considered as a **Writing** event. During the lesson, or sometimes even in the middle of the presentation, the teacher would stop the presentation and explain things to the pupils orally. This was again an **Auditory** event.

3.9.9 A description of a lesson

It was thought at first that the lesson would begin with the interactive presentation, but this idea was abandoned soon after the first lesson, because the researcher noticed that the teachers needed to integrate their experience in their work with the different teaching modes and to revise the material taught in the last lesson with the pupils by frontal teaching. Thus, the lessons began with a review of the material that had been learnt in the previous lesson. This was considered as an **Auditory** event.

The presentation began after this introduction. The subject was explained using pictorial animation, colours, and sound. During the presentation, the pupils were asked to answer questions that appeared in the presentations, so that the learned material was explained through Questions and Answers. For every question asked in the presentation, the presentation gave an almost immediate answer, accompanied by sound, pictorial animation or pictures, so that the pupils could see if they had given the right answer. The presentation concluded with a summary and the grammatical rules were formulated.

Where she felt it was necessary the teacher, at her discretion, added explanations and then continued with the presentation from the place where she had paused. The interactive presentation only continued when the 'Enter' key was pressed, so that the teacher was able to intervene with explanations and insights, or allow the pupils to copy the rules in writing or to read the rules, sentences or stories out loud before proceeding. At the end of the presentation worked in their notebooks employing Kinaesthetic learning activities. Thus, different learning styles were expressed during the lesson: Visual, Auditory, Reading/Writing, and Kinaesthetic.

CHAPTER 4: ANALYSIS OF FINDINGS FROM THE QUESTIONNAIRES

4.1 Introduction

As explained in the previous chapter, the present research followed a constructivist paradigm, using an inductive methodology that employed mixed qualitative and quantitative data collection tools. The data collected provided a rich description of a case study examining whether lessons that combine different teaching styles (Visual, Auditory, Reading/writing and Kinaesthetic) employing a multimedia, multisensory presentation and a Kinaesthetic exercise book hinder or assist the learning of primary school pupils (attention, absorption, mastery and memorization) with different personal learning styles, according to the pupils' responses.

The research tools included questionnaires, interviews and observations produced data recording the pupils' responses to these lessons in order to answer the research questions. These findings from the different tools and their analysis are presented in Chapters 4, 5, 6 and 7.

This chapter presents the findings derived from quantitative data-collection tools: the VARK Questionnaire and the Hindrance to Learning Questionnaire.

4.2 Findings from the VARK Learning Style Questionnaire

Responses to the VARK Questionnaire (see Chapter 3.7.2 Pre-research Preparations) were received from 71 pupils (23 from Class E1; 20 from Class E2 and 28 from Class F).

In the VARK questionnaire (see Appendix 3.1), each question presents a choice of four statements, where each statement indicates the use of a particular learning style, for example:

1 When you have a few minutes with nothing better to do would you be more likely to:

a stare into space or doodle.

b talk to yourself or to others.

c pick something up to read.

d do something practical, like fix something or straighten up your room.

In the above example, if the pupil marks (a) this indicates a preference for a Visual learning style, (b) would indicate a preference for an Auditory (Aural) style, (c) indicates preference for a Reading/writing style and (d) indicates a preference for a Kinaesthetic learning style.

The pupil can respond by marking more than one statement as suitable for them. In the above example this might be by marking a and d. These multiple choices indicate the pupils' preferred learning styles. In different combinations, Fleming and Millis (1992) composed thirteen different variations of the four basic learning styles (Visual, Auditory(Aural), Reading/Writing and Kinaesthetic). These four basic learning styles were matched by the teaching styles employed by the teachers (used in combination during the lessons). (For details concerning the construction of the VARK questionnaire see Section 3.7.2 above).

4.3 Findings for 'Hindrance of Learning' Questionnaire

The questionnaire examined the extent to which the experimental lessons hindered the pupils' learning (see Appendix 3.4); more specifically it measured the degree to which exposure to a specific teaching style within the combination of the four teaching styles hindered the pupil's learning according to their own individual learning style.

Four questions related to possible hindrance caused by teaching according to each learning style: hindrance caused by Visual strategies (e.g.: *animations in the presentation distracted me from understanding the lesson*), Auditory strategies (e.g.: *the teacher's explanations distracted me from concentrating on the lesson*), Reading / writing strategies (e.g.: *I understood the presentation and the text interfered with my concentration*), and Kinaesthetic strategies (e.g.: *use of the*

exercise book was not necessary because I already understood the lesson from the presentation).

Half of the questions were reversed to avoid response sets. Internal consistencies – examined according to Cronbach's α - and reversed items, are shown in Table 4.1 below.

Table 4.1: Internal Consistencies for the Hindrance Questionnaire

Hindrance due to:	Questionnaire Items	Internal consistency (Cronbach α)
Visual strategies	1r, 5, 9r, 13	0.59
Auditory(Aural) strategies	2, 6r, 10r, 14	0.65, without item #2: 0.80
Reading / writing strategies	3r, 8, 12r, 16	0.51
Kinaesthetic strategies	4, 7r, 11, 15r	0.59

Key: r = reversed items.

Table 4.1 above shows that some internal consistencies are rather low (below .60), but nevertheless the scales may need to be used with caution. Due to these internal consistencies the research question was therefore examined with both the scales and the individual items.

Items were coded so that the higher the score the greater the hindrance. It should be noted that within the Auditory (Aural) strategies three items (#6, 10 and 14) pertained to the teacher, while one (#2) pertained to the Audio-Visual presentation. For this reason, due to the differences in internal consistency when including or excluding item 2, and in line with Research Question 1b, it was decided to use the scale without this item, so that it remained as a scale of the teacher's verbal

explanations, and examining item 2 as a separate item when considering all items separately (Research Question 1b).

4.3.1 Results

The following are the results of the questionnaires according to the research questions that they answered.

Research Question 1

1. Does a combination of teaching styles hinder the learning of a pupil with a particular individual learning style?
    a. To what extent do pupils diagnosed with different VARK learning styles report a hindrance to their learning when they are exposed to learning that provides combined teaching styles, including styles other than their own?
    b. Do pupils who have a learning style composed of more than one style experience greater hindrance to their learning than pupils who learn with a single learning style?
    c. Which component of the combined teaching styles helps or hinders pupils with a particular learning style.

Preliminary analysis

As explained above, the pupils completed the VARK questionnaire at the beginning of the school year, in order to determine their preferred learning style. Table 4.2 shows the distribution of the pupils' learning styles. It is clear that a combination of all four styles – VARK - is the most frequently occurring preference (40.9%), followed by exclusive preference for the Reading/Writing style (R) (16.9%) and then by exclusive preference for the Kinaesthetic style (11.3%).

Table 4.2: Distribution of Preferred Learning Styles (N=71)

Learning style	Frequency	Per cent
Visual (V)	1	1.4
Auditory (Aural) (A)	3	4.2
Reading / writing (R)	12	16.9
Kinaesthetic (K)	8	11.3
A and K (AK)	1	1.4
A and R (AR)	1	1.4
R and K (RK)	5	7.1
V and A (VA)	1	1.4
V and K (VK)	1	1.4
V and R (VR)	1	1.4
V and R and K (VRK)	3	4.2
A and R and K (ARK)	1	1.4
V and A and K (VAK)	4	5.6
V and A and R (VAR)	0	0.0
V and A and R and K (VARK)	29	40.9
Total	71	100.0

In order to examine the first research question the four basic learning styles V, A, R and K were defined as four variables, such that one style and its combination with other styles were defined as a single variable for all pupils. For example, the variable V represents 40 pupils as follows, V (1 pupil), VA (1), VK (1), VR (1), VRK (3), VAK (4) and VARK (29).

Using this approach the distribution of pupils' preferred learning styles was as follows:

- Variable V = 40 pupils
- Variable A = 40 pupils
- Variable R = 52 pupils
- Variable K= 52 pupils

Prior to examining the first research question differences in the distribution of the preferred learning styles were examined for the three studied classes, as shown in Table 4.3 below. The differences were examined using the Chi-Square test, measuring differences in the observed counts by class. No significant differences were found in the distribution of the learning styles between the classes.

Table 4.3: Distribution of Preferred Learning Styles by Class (N=71)

Classes:	Class 5a		Class 5b		Class 6		$\chi^2(2)$
	N	%	N	%	N	%	
Visual (V)	14	60.9	12	60.0	14	50.0	0.76
Auditory (Aural) (A)	12	52.2	14	70.0	14	50.0	2.14
Reading / writing (R)	17	73.9	14	70.0	21	75.0	0.16
Kinaesthetic (K)	17	73.9	14	70.0	21	75.0	0.16

The data represented in Table 4.3 above show that each learning style was present among 50-75% of the pupils of each class, with no significant differences between the classes.

In addition, differences in the hindrance variables were examined with a multivariate analysis of variance (MANOVA), by class, as shown in Table 4.4 below.

Table 4.4 Differences in the Hindrance Variables by Class (N=71)

	Classes						
	Class 5a (N=23)		Class 5b (N=20)		Class 6 (N=28)		F(2,68) (η^2)
Hindrance	M	SD	M	SD	M	SD	
Visual (V)	1.62	0.50	2.06	0.66	1.80	0.55	3.21* (.09)
Auditory (Aural) (A)	1.91	0.79	1.63	0.56	1.71	0.72	0.92 (.03)
Reading / writing (R)	1.79	0.59	1.97	0.63	1.70	0.58	1.24 (.04)
Kinaesthetic (K)	2.24	0.66	2.32	0.60	1.87	0.50	4.25* (.11)

$p<.05$

Table 4.4 above shows no significant differences between classes for Auditory (Aural) and Reading/writing related hindrances, yet it does show significant differences for Visual and Kinaesthetic related hindrances. The extent of these differences is quite small (η^2 is .09 and .11), yet they are statistically significant. Post-hoc analyses (Tukey test) revealed that for Visual related hindrances the significant difference was between Class 5a and Class 5b, with the first reporting lower levels of hindrance, while for the Kinaesthetic related hindrance the significant difference was between Class 5b and Class 6, with the second reporting lower levels of hindrance. These differences are inconsistent and pertain to two of the four hindrance variables. In addition, their magnitude is small. Thus, the first research question was examined for the total sample, yet the interaction between class and Visual / Kinaesthetic related hindrances was also examined.

Research question 1a

This question dealt with the hindrance reported by pupils with different combinations of VARK learning styles when exposed to teaching that included strategies based on learning styles that differed from their own.

As mentioned above, in order to examine this question the pupils preferred learning styles were defined (whether in combination with other styles or not). The difference in reported hindrance according to learning style was examined with a t-test for each learning style. Table 4.5 shows means, standard deviations and t-tests comparing hindrance levels for pupils with and without each learning style.

Table 4.5:

Differences in the Hindrance Variables by Learning Style (N=71)

	Learning style						
	With the style			Without the style			**t(69)**
	Mean levels of hindrance and standard deviations						
Hindrance	N	M	SD	N	M	SD	
Visual	40	1.86	0.60	31	1.75	0.56	0.82
Auditory (Aural)	40	1.61	0.66	31	1.94	0.72	1.99 (p<.06)
Reading / writing	52	1.74	0.58	19	1.99	0.63	1.64
Kinaesthetic	52	2.09	0.60	19	2.18	0.65	0.58

Table 4.5 above shows that, in general, there are no significant differences in the pupils' reports of hindrance according to their learning styles. That is, pupils with or without a certain learning style report that the use of another style causes a similar level of hindrance to their learning. A marginal difference was found for Auditory teaching strategies (the teacher's explanations) where pupils who did not prefer

the Auditory learning style reported that the teacher's explanations interfered with their learning more than pupils who preferred the Auditory learning style.

An examination of the differences in reported hindrance by the interaction of learning style and class, according to the differences shown in Table 4.4, revealed that they were non-significant (for Visual hindrance $F(2,65)=0.60$, ns; for Kinaesthetic hindrance: $F(2,65)=0.92$, ns). That is, the previously found (see Table 4.4 above) differences in hindrance levels by class, did not have an effect when examining the reported hindrance by learning style.

Finally, it is interesting to note that beyond the pupils' learning styles, a general difference was found in the extent to which they reported hindrance caused by the teaching strategies. The Kinaesthetic teaching style ($M=2.11$, $SD=0.61$) caused significantly greater hindrance than all other types (Visual hindrance - $M=1.81$, $SD=0.59$, Auditory - $M=1.75$, $SD=0.70$, Reading/writing - $M=1.81$, $SD=0.60$, $F(3,68)=5.06$, $p<.01$, $\eta^2=.18$). The general extent of reported hindrance was rather low, and even the mean of the most hindering teaching style – the Kinaesthetic teaching style – was below the middle of the scale.

In sum, no differences were found in the extent to which hindrance was reported by pupils with Visual, Auditory, Reading/Writing or Kinaesthetic learning styles when exposed to teaching that used strategies based on learning styles other than their own. To a marginal extent Auditory strategies used by the teacher (her verbal explanations) caused more hindrance for pupils whose learning style did not include the Auditory style. In addition, in general, irrespective of the pupils' learning styles, Kinaesthetic teaching strategies caused more hindrance than other teaching strategies.

Research question 1b

This question focused on the components of teaching strategies corresponding to the various learning styles and the extent to which the pupils reported that they hindered their learning, investigated according to the pupils' different learning styles.

This question was examined by using the items of the questionnaire to compare the extent of hindrance reported by pupils with VisualAuditoryKinaesthetic learning styles. In light of the ordinal scale of the items of the questionnaire, differences were examined with Z tests, as shown in Table 4.6 below.

Table 4.6: Differences in the Hindering Items by Learning Style (N=71)

	Learning style:						
	With the corresponding learning style			**Without the corresponding learning style**			**Z**
Hindrance	N	M	SD	N	M	SD	
Visual	40			31			
1. Animations interfered with understanding		1.65	0.80		1.55	0.68	0.38
5. Pictures interfered with understanding		2.11	1.01		1.97	0.95	0.57
9. Pictures distracted pupils' attention		1.88	1.07		1.71	0.82	0.35
13. Coloured text interfered with understanding		1.87	0.81		1.77	1.02	1.02
Auditory(Aural)	40			31			
2. Sound in the presentation hindered concentration		2.55	1.01		2.16	0.90	1.64
6. Teacher's explanation hindered learning		1.68	0.84		2.07	0.87	1.97*
10. Teacher's explanation distracted concentration		1.67	0.77		1.74	0.86	0.28
14. Teacher's explanation hindered understanding		1.48	0.75		1.97	0.80	2.96**
Reading / writing	52			19			
2. The text in the presentation distracted concentration		1.62	0.72		2.05	0.91	1.95 (p<.06)

8. The text in the presentation hindered understanding		1.75	0.86		2.05	1.08	1.02
12. Copying from the presentation to the exercise book distracted concentration		1.85	0.92		1.68	0.95	0.81
16. Copying from the presentation to the exercise book hindered understanding		1.73	0.95		2.17	1.15	1.45
Kinaesthetic	52			19			
4. Use of the exercise book hindered understanding		1.63	0.69		1.68	0.67	0.36
7. Use of the exercise book distracted pupils' attention		1.79	0.91		2.05	1.08	0.89
11. Tasks in the exercise book hindered understanding		2.69	0.97		2.89	0.88	0.69
15. Use of the exercise book was unnecessary		2.25	0.95		2.11	0.88	0.51

*p<.05, **p<.01

Table 4.6 above shows few differences in the items pertaining to the four learning styles, when comparing the extent of hindrance to learning for pupils with and without the specific corresponding learning style. Differences were found for two Auditory items, pertaining to the teacher's explanations, in which a greater extent of interference was reported by pupils whose learning style did not include the Auditory style. These differences are in line with the general difference found earlier (see Table 4.5 above). No difference was found in the extent of hindrance caused by sound (Auditory elements) in the presentation, between pupils with and without the corresponding Auditory learning style, yet it is interesting to note that, in general, sound in the presentation was reported as more disturbing to the pupils than the teacher's explanations ($\chi^2(3)=39.85$, $p<.001$).

A marginal difference was found regarding one Reading/writing item, according to which having to read text in the presentation caused slightly more hindrance to pupils whose learning style did not include the Reading/writing style. No

differences were found in levels of hindrance regarding the Visual or Kinaesthetic items between pupils with and without these two learning styles, respectively.

In sum, few differences were found in the extent to which items in the questionnaire were reported as causing hindrance to the learning of pupils with Visual, Auditory, Reading/writing and/or Kinaesthetic learning styles. Two Auditory items, relating to the teacher's explanations, were more interfering to pupils without the Auditory learning style than to pupils with the Auditory style. One Reading/writing item, the need to read text in the presentation, created marginally greater hindrance to pupils who did not prefer the Reading/writing learning style than to pupils who preferred this style. No differences were found regarding the hindrance caused by other Auditory or Reading/writing items, as well as regarding the Visual or Kinaesthetic components.

Research Question 1C

This question centred on the differences in reported hindrance to their learning between pupils whose learning style was composed solely of one style in comparison to pupils whose learning style combined at least two styles, when exposed to teaching strategies that combined Visual, Auditory, Reading/writing and Kinaesthetic styles.

This question was examined by comparing the extent of hindrance reported by pupils with one learning style (visual, auditory, reading / writing or kinaesthetic) in comparison to pupils with a combination of at least two styles.

The distribution of the pupils' learning styles revealed that 24 of them (33.8%) had a single learning style, 10 (14.1%) had a combination of two styles, 8 (11.3%) had a combination of three styles, and 29 (40.8%) had all four learning styles.

The difference in reported hindrance according to level of multiplicity of learning styles was examined with a t-test in relation to the reported hindrance for each style. Table 4.7 shows means, standard deviations and t-tests comparing hindrance levels for pupils with and without multiple learning styles.

Table 4.7: Differences in Hindrance Variables by Multiplicity of Learning Styles (N=71)

	Learning style				
	Single Learning style (N=24)		Multiple Learning styles (N=47)		t(69)
	Level of Reported Hindrance				
Hindrance	M	SD	M	SD	
Visual	1.67	0.51	1.89	0.61	1.54
Auditory (Aural)	1.89	0.71	1.68	0.70	1.19
Reading / writing	1.83	0.61	1.79	0.60	0.25
Kinaesthetic	2.24	0.65	2.05	0.59	1.18

No differences were found in the extent of reported hindrance to learning reported by pupils with one or multiple learning styles, when exposed to teaching that used strategies based on multiple learning styles. An attempt was made to explore differences in reported hindrance between three groups of pupils: (1) with one learning style, (2) with two or three learning styles, and (3) with all four learning styles. Again, no significant differences were found (for Visual hindrance: $F(2,68)=1.48$, ns; for Auditory hindrance: $F(2,68)=2.30$, ns; for Reading/writing hindrance: $F(2,68)=0.06$, ns; for Kinaesthetic hindrance: $F(2,68)=1.02$, ns).

Differences in hindrance caused by the combined teaching styles were reported for two of the 16 questionnaire items between pupils with a single learning style and pupils with multiple learning styles. First, sound in the presentation was more disturbing to the concentration (#2 of the Auditory style) of pupils with multiple learning styles (M=2.57 SD=0.97) than to the concentration of pupils with a single learning style (M=2.00 SD=0.89) ($Z=2.40$, $p<.05$, Mann Witney U test for ordinal variables). Second, use of the exercise book (#7 of the Kinaesthetic style) was more frequently reported as creating a hindrance by pupils with a single learning style (M=2.16 SD=1.01) than by pupils with multiple learning styles (M=1.70 SD=0.91) ($Z=1.97$, $p<.05$, Mann Witney U test). These two differences should be

interpreted with caution as they relate to only two out of the possible 16 items and may be random.

In sum, no meaningful differences in reported hindrance were found between pupils with one learning style and pupils with multiple learning styles, when exposed to teaching strategies that combined Visual, Auditory, Reading/writing and Kinaesthetic learning styles.

To conclude: the first research question focused on the extent of hindrance to learning experienced by pupils with different individual learning styles when exposed to teaching that integrates other learning styles. It was divided into three sub-questions.

The first sub-question dealt with the extent to which pupils with Visual, Auditory, Reading/writing and Kinaesthetic learning styles reported hindrance to their learning when exposed to teaching that integrates other learning styles. No differences were found in the extent to which hindrance was reported by pupils with a certain learning style when exposed to teaching that used strategies based on other learning styles that differed from their own. To a marginal extent the teacher's verbal explanations (Auditory strategies) caused more hindrance for pupils whose learning style did not include the Auditory style. Kinaesthetic strategies tended to cause more hindrance than other teaching strategies.

The second sub-question dealt with the components of the teaching strategies that were based on the various learning styles (Visual, Auditory, Reading/writing or Kinaesthetic) that assisted or hindered learning more than others, according to the pupils' learning styles.

Few differences were found in the extent to which items in the questionnaire were reported as causing hindrance. As mentioned above, two Auditory items, i.e., the teacher's explanations, caused greater hindrance to pupils without the Auditory learning style than to pupils with the style. One Reading/writing item, the need to read text in the presentation, was marginally more hindering for pupils without the Reading/writing learning style than for pupils with this style. No other differences were found.

The third sub-question dealt with the extent to which hindrance to learning differs between pupils whose learning style is composed of one style in comparison to pupils whose learning style combines several styles, when exposed to teaching strategies that combined the four styles (Visual, Auditory, Reading/writing or Kinaesthetic). No meaningful differences in reported hindrance were found between pupils with one learning style and pupils with multiple learning styles, when exposed to teaching strategies that combined the various learning styles.

It may be concluded that pupils with different individual learning styles do not tend to experience hindrance to learning when exposed to teaching that integrates learning styles other than their own.

CHAPTER 5:
DATA COLLECTION AND ANALYSIS FROM THE INTERVIEWS

Although the method of data-collection from the interviews was described briefly above in Section 3.6.2 above, this chapter includes details regarding the sequence of stages involved in the data-collection from the interviews together with the findings and their analysis. The researcher shows how she studied and understood the data by looking at them from different angles in order to clarify themeaning of the pupils' expressions in depth and breadth. It was considered that any separation of the data-collection process from its analysis and presentation (as normal in thesis presentation) would in this case interrupt the reader's understanding of the logical and methodical sequence of the inquiry.

5.1 Conducting the Interviews

The experimental lesson that formed the basis for the research is described in detail above (see section 3.9.9: A Description of a Lesson). These lessons combined five teaching styles, Visual (V), Auditory – sounds in the presentation (A), Auditory – the teacher's oral explanations, Reading and Writing (R) and Kinaesthetic (K).

In order to probe the studied phenomena (the pupils' reactions to these lessons) in depth and to understand its meaning, interviews were conducted with the pupils from Class E2. In these interviews the pupils were asked about their feelings regarding each of the learning style elements employed in the lesson and how they had influenced their learning processes.

5.1.1 The Choice of the Interview Sample

Class E2 was chosen for the interviews because although the diagnosed learning styles of the pupils in this class were varied (10 pupils diagnosed with VARK, 3 pupils with R, 2 pupils with A, two pupils with K, one pupil with combined VK, (+ one with VAK and one with VAR) there were several pupils in this class who were diagnosed with the same learning style, thus allowing the researcher to examine

the words of pupils who had the same learning style and to see whether they had similar opinions concerning the lessons. Additionally this class included several pupils diagnosed as needing special education who studied together with other regular pupils in this class, and the researcher wanted to gather data from these special education pupils.

5.1.2 Interviews with Class E2 pupils: Technical and organisational aspects

This section explains how the interviews were conducted, their location, time, duration, explanations to the pupils, number and type of the interviews and the type of interviewer.

The researcher herself conducted the interviews in the last weeks of the research, since the researcher wanted to listen to the pupils after they had experienced the experimental lessons, and consolidated their personal opinions concerning these experiences.

It is very important in any interview to explain the purpose of the research to the interviewees in language that they understand (Spradley, 1979) so the researcher explained the interview and its significance for the research to the teachers and to each and every pupil who was interviewed. The researcher also explained to the pupils that they could express themselves as they wished and say what they really felt, even if they expressed resistance, since the interviews were solely for the purposes of the research (Shlaski & Alpert, 2007), and would not be used for any other purpose outside the research. She also explained that their full names would not be cited in the research report, only their initials. This procedure is explained in Section 3.8: Ethics.

The researcher also told the pupils that their participation in the interviews was not compulsory, and if they did not want to participate in the interview they could leave. However, the researcher also explained the importance of their contribution to the research if their voice was heard (Izikovitz, 2003).

The interview took place approximately quarter of an hour before the beginning of the experimental lesson. The researcher took one of the pupils at a time from the classroom to the library, at a time when the library was not being used and the room was quiet. The researcher began by creating an accepting atmosphere,

taking care to respect the pupil and to remain alert and attentive to absorb all the information offered. The researcher understood that the interview was a data gathering tool that would contribute to the research processes, if properly handled and attempted to apply the suggestion of Shkedi (2003) that the interviewee should be made to feel comfortable during the interview so that the interview would produce positive results. The researcher asked each interviewee whether she could record the interview so that she could repeatedly listen to the answers later, and received the consent of all the pupils for this process (Spradley, 1979).

The questions asked by the researcher relied on the types of questions suggested by Spradley (ibid): focussed theoretical questions. The interviewer asks the interviewee a question and then asks the interviewee to tell him/her again, reconstructing the tale with a particular focus within a very short period of time or to provide specific information.

Thus in the present study, the researcher asked the pupil guiding questions relating to their feelings during the experimental lesson. Initially the pupil was asked a focussed theoretical question, for example:

> *You learnt new subject matter with the assistance of a presentation, were there things in the presentation that hindered your concentration and absorption of the subject matter.*

The pupil responded and in accord with their response a more specific question was asked aiming to collect data concerning the pupil's feelings in relation to one of the learning style elements included in the lesson (V, A, a, R, or K). For example a question relating to the teacher's oral contributions to the lesson (a) might be:

> *If you understood things so well from the voices, colours and animation in the presentation, then why was there a need for the teacher's explanations in the middle?*

Another example relating to the Visual element (V) might be:

> *Some children think that animation and sounds simply attract attention, and the children pay attention to the animation and do not concentrate on the subject matter that the presentation should teach. What do you think?*

An additional example relating to the Reading/writing element (R):

> *And how did you feel when you did not only read from the presentation, but also needed to take out a pencil and notebook and copy the rules from the presentation?*

An example of a question relating to the Kinaesthetic element:

> *I understand that the teacher's explanations were not superfluous for you, and perhaps after you understood from the presentation and the teacher's explanations, the work in the exercise book was unnecessary?*

In total, interviews were held with twenty pupils from Class E2. Each of the class's pupils, without exception, agreed to cooperate. Each interview lasted 15 minutes.

During the interviews it seemed that the pupils were calm, felt comfortable, and were even happy to tell the researcher about their feelings concerning the experimental lesson. The interviews were as open as possible. A question was asked and the pupil was given time to answer at length without any intervention by the researcher. The researcher added questions while listening to and observing the interviewee and at the same time remaining focussed on the research questions.

According to Rosenthal (1993) and Jovchelovitch and Bauer (2000) interviewers may add guiding questions concerning subjects and events that have not yet been mentioned and the interviewer can advance from one stage to another according to the circumstances of the interview. An interview is conducted with a research intention of some kind. The interviewer needs to be aware of their intention.

The interview may be structured, semi-structured or open. In the present study the interview was semi-structured and the researcher understood that the interview was not a neutral data-collecting tool but rather an active interaction between two people (Fontana & Frey, 2000) that according to Seidman (1991) captures a combination of opinions and feelings of the interviewees without distortion. In other words the interviewees' intention is captured authentically as it is.

The activity of the interviews ended immediately when the bell sounded to announce the break, even if the interview was in its middle. This was done in order to allow the pupils to enjoy their break and also to prevent the pupils being under

pressure because they knew that the other pupils in their class were playing outside.

The interviews were recorded with the help of a tape-recorder in order to enable a continuous flowing conversation, and the tapes were later transcribed into a separate computer file. Recording the interview enables the interviewer to listen to the pupils and then to rehear it later since the recording preserves the interview word by word (Pidgeon & Henwood, 1996), including non-verbal sounds such as coughing, laughter and excitement (Seidman, 1991) (see Appendix 5.1).

5.2 Data Analysis Methods

Qualitative analysis involves the division of data into parts, and re-organisation of these parts into a new analytical order where each part constitutes a 'unit of meaning'. These 'units of meaning' are identified through a careful reading of the interviews, observations, documents and remarks (Pidgeon & Henwood, 1996). With the help of this analysis the researcher should be able to construct the answers to the research questions. The analysis should be reported in detail so that it is transparent at all stages (Miles & Huberman, 1984) and readers of the thesis can know and understand the researcher's processes and practices.

Subject analysis relates to the words used by the interviewees in their descriptions to reflect their emotions, thoughts and beliefs. According to Shkedi (2003) it is possible to identify two techniques of subject analysis:

- Word analysis technique – counting key words that appear in the text, taking words out of their context.
- Analysis of sections of text

Qualitative researchers should, as far as possible, be aware of their own conceptual perspective stemming from their previous experience and professional knowledge, since they should optimally deduce the analytical categories directly from the analysis and not allow their own perceptions and hypotheses to determine the results (Charmaz, 1995).

5.2.1 Principles of the Analytical Process

Strauss & Corbin (1990) describe different approaches to the analysis and interpretation of data collected as a final product from qualitative tools. In accordance with the research goals, the product of qualitative analysis may take significantly different forms with regard to the extent of its abstraction ranging from a theoretical product to a general theory. The following approaches are described:

- The presentation of data without any analysis
- Focussed and accurate theoretical work
- Theory construction

In the present research, the researcher used focussed theoretical work, constructed in stages, where each stage relies on the previous stage and gives a different viewpoint on the data. Initially the researcher read the data several times and asked the necessary questions in order to create a complete picture of the data and then she divided the data into units of meaning (Agar, 1980).

5.2.2 The Data Analysis Stages

The researcher was helped by eight stages of data analysis each of which relied on its predecessor and produced a different viewpoint concerning the data, so that it detailed the nuances and minutiae. The process was assisted by the colouring of different sections of text, and presentation of the data in tables, charts and graphs.

Stage A

Reading the interviews and marking the expressions that reflect emotion and thinking. In order to observe the data more closely the researcher went on to the next stage.

Stage B

Markering the text with colours: 'assisted' = green, 'hindered' = red and 'important' = purple for emphasis and sorting (for examples of this analysis see Appendix 5.1: Annotated Transcripts of the Interviews). The marking made it easier to observe

the different nuances in the text but made it necessary to form classifying categories.

Stage C

This stage included the creation of categories (Visual, Auditory, Reading/Writing and Kinaesthetic) and recording the expressions of each pupil in a categorised table according to these categories. For example a cell in the table included all FE's remarks concerning the Visual element (expressions reflecting assistance and expressions reflecting hindrance). The findings presented in the table were then summarised for each pupil and for each group of pupils diagnosed with the same learning style (e.g. the group of pupils diagnosed with VARK style – see Table 5.3 below). A more detailed categorisation was then necessitated, separating the expressions in each cell into those that reflected assistance to the pupil's learning and those that reflected hindrance. This was performed at the next stage.

Stage D

Creation of criteria for expressions reflecting hindrance and expressions reflecting assistance that appeared in the interview transcripts. This time the table was also sorted according to the types of consideration by the pupils for each of the elements (Visual, Auditory, Reading/Writing and Kinaesthetic) that appeared in the experimental lesson. Thus a single cell in the table contained all FE's remarks concerning the assistance that he experienced from the Visual element while another cell would contain all FE's remarking concerning the hindrance that he experienced during the use of the Kinaesthetic element in the lesson. In order to produce a graphic illustration of these findings the researcher entered a further stage of the analysis process.

Stage E

This stage included the creation of a table showing graphic symbols in order to present a Visual display of the data with more specific criteria. Each element that appeared in the lesson (Visual, Auditory, Reading/Writing and Kinaesthetic) was divided into three categories: 'assisted', 'hindered' and 'did not assist'. Since the use of symbols indicated that the same pupil sometimes made remarks that expressed both assistance and hindrance for the same criterion, a further stage of

analysis was necessitated in order to make a more accurate distinction and to see whether a particular component of the particular teaching style (V, A, a, R or K) assisted or hindered the pupil's learning and why it assisted or hindered the pupil's learning process, understanding of the subject matter, memorisation, absorption or pleasure?

Stage F

The creation of complex tables including colours and graphic symbols, with the criteria of assistance broken into the following sub-categories:

Assisted concentration and listening/ OR attention	Assisted subject matter comprehension	Helped to master the subject matter and remember it	Attracted attention and helped to awaken interest	Assisted in simplifying the subject matter	Helped to strengthen confidence and self-checking of mastery of subject matter	Gave pleasure

The graphics in the table were intended to detail which of the components of the teaching styles employed in the lesson was felt by the pupils to assist or hinder them and how. A summary was composed for each group of pupils.

Stage G

It was discovered that the pupils' expressions reflected elements of theories concerning motivation. It was therefore decided to sort the data as follows, beside each of the pupil's expressions reflecting assistance the following concepts relating to motivation were written as relevant: capability, belonging, autonomy, internal motivation and/or external motivation.

Stage H

It was now important to see for each pupil, which element of the lesson that included combined teaching styles produced the expressions relating to motivation. For this purpose the researcher constructed a specially categorised table that included the criteria of motivation and a cell was devoted to each pupil that marked which element in the lesson (Visual, Auditory, Reading/Writing and Kinaesthetic) elicited the expression of assistance.

When the tables were completed, the researcher summarised the results for the groups according to their learning styles in order to try to see whether the combination of different teaching styles assisted the pupil with a particular learning style and how.

5.3 Extracting Data at each Stage

5.3.1 Stage A

Distinction between feelings and cognitive thinking

A distinction was also drawn between what the pupil felt and what the pupil thought was important. Example 1 below clarifies this point. There are things that the pupil felt good about and liked. In contrast there were things that they knew were important, for example preparing homework is important because it helps them to practise and exercise what they have learnt in school. They therefore make positive remarks about these issues although this does not reflect what they feel. As far as possible the researcher tried to distinguish between what the pupils felt and what they thought was important.

The researcher was helped by the phrase '*that's important'* when that was often voiced by pupils, when they seemed to separate themselves for a moment from their feelings and went on to describe things that they considered important.

Example 1

In the interview of Pupil EY, who was diagnosed as having a VARK learning style, it was possible to distinguish between words that expressed his love of certain things in the experimental lesson and words which expressed his understanding that certain things were important, perhaps as the result of influence of messages transmitted to him by the teacher, parents and friends. Thus, when the researcher repeated the question, he said what he thought that the researcher wanted to hear and not necessarily what he felt.

At first he said '*the voices didn't really help me'* and later *'I don't say that, I think it helped me, but I don't like it when it* [the presentation] *is stopped'.* And again A speaks about what he feels and likes, and what he thinks is important, with regard to writing and work in the Kinaesthetic exercise book: '*that's right, it's not difficult to*

understand the subject matter just from the presentation, but exercising is important and it helps'.

EY who had been diagnosed as preferring a VARK learning style was hindered by writing and voices from the presentation (but not the teacher's oral explanations) reading, reading out loud from the presentation or many pictures; in fact nearly all the learning styles employed in the presentation disturbed him (V, A or R/W), despite the fact that he was VARK and despite the fact that the researcher had the impression from the his words that he loved the experimental lessons:

> *Actually the animation and the sounds made everyone quiet and they focussed on the presentation. In a regular lesson the teacher has to ask the pupils a thousand times to look at her, and to stop playing around in the lesson with all sorts of things. In the lesson with the presentation the teacher never said a thing.*

He liked it when the presentation was working but did not like the interruptions in the middle when things were explained; nevertheless he said that all the learning styles hindered him.

Coding and categorisation constitute the core of the text analysis process in a qualitative research (Ryan & Bernard, 2000). A category can be seen as a tool that organises the pieces of data according to relevant characteristics (Lieblich et al., 1998). Categorisation is based on selection, distinction and separation within the sequence of data in order to reach the meaning of the data (Seidel & Kelle, 1995) and to reveal the connections between them and the common strategic implications within the categories.

The Concept-Indicator Model (Strauss, 1987) is based first of all on a comparison between one content item and another (thoughts, descriptions of activities, beliefs) conducted by the researcher. Following this comparison between items they are sorted into groups with common items so that the categories can now be named, as was done in Stage B of the research, described below.

5.3.2 Stage B

Since the researcher noticed that in the interviews the pupils ascribed importance to some of events and used words such as *it's important'* the researcher reread all the interviews and marked the words that described a positive experience in the text such as: *'fun', 'nice', 'wonderful'* in green ink, while other words that belonged to a negative experience such as: *'didn't help', 'hindered', 'annoyed'* were marked in red ink. Words that described thinking such as: *'I think that it's important'* were marked in purple ink (see Appendix 5.2: Categorising Pupils' Interview Expressions). These categories were formed to sort and organise the mass of data.

Next the researcher continued to Stage C in the reorganisation of the pieces of data into an analytical order where each piece constituted 'a unit of meaning', keeping the research goal in mind and understanding that it was important to clarify how the pupils had experienced the Visual, Auditory, Reading/Writing and Kinaesthetic elements of the lesson in correspondence with their own personal learning styles. The researcher used this strategy to draw out covert insights from the transcribed text.

5.3.3 Stage C

At this stage the researcher created categories that would sort the pupils into groups according to the pupils' preferred learning styles and these were indicated by the appropriate letters e.g. Visual (V):

Table 5.1: Categories of Pupils by Preferred Learning Style

Pupils' preferred learning style	Reading and writing (R)	Visual, Auditory, Reading/writing and Kinaesthetic (VARK)	Auditory (A)	Visual and Kinaesthetic (VK)	Visual, Auditory and Kinaesthetic (VAK)	Visual, Auditory and Reading/writing (VAR)
Names of pupils in group	PA, HM, HL	EY, FZ, FA, FB, FC, GF, GG, GI, JQ	FE, JP	GH	HK	HN

The researcher then examined the influence of each element (learning style) that appeared in the lesson on each group of pupils, according to their words. Words that described a positive experience such as: 'fun', which had been marked in green ink at the previous stage B to indicate a positive experience (see Appendix 5.2: Categorising Pupils' Interview Expressions) and words such as: 'annoying' that had been marked with red ink to indicate a negative experience were now collected in this stage and sorted according to their association with the Visual, Auditory, Reading/writing or Kinaesthetic events in the lesson.

The Findings at Stage C

Table 5.2: Findings for the R Group

Remarks made by Members of the R Group			
Category 1(V) relating to the Visual elements of the lesson	**Category 2 (A) relating to the Auditory elements of the lesson**	**Category 3 (R) relating to the Reading/writing elements of the lesson**	**Category 4 (K) relating to the Kinaesthetic elements of the lesson**
HL: Animation and the pictures didn't hinder her *'the animation didn't bother me, nor did the pictures'*. Q*: 'Did the colours on the words help you?'* A: *'Yes'.*	HL: *'the voices in the presentation didn't help; the teacher's explanations didn't hinder me'.*	HL: *'reading out loud did not help; writing the rules in the exercise book did not hinder me'*.	HL: *'the work in the exercise book seriously helped me to concentrate on the subject matter; you need to work in the exercise book'.*
HO – *'liked the animations and they helped'*, *'it was easy to understand when there were pictures' and 'the marking with colours helped me'*.	HO: *'the voices in the presentation helped me to understand and the teacher's explanations were unnecessary'.*	HO: *'reading out loud helped me to concentrate; writing rules in the exercise book was boring*'.	HO: *'the work in the exercise book was boring and I began to do other things' When the researcher presses him further he says 'sometimes the exercises helped'.*
HM: *'the animations attracted my attention and made me concentrate', 'the pictures were also amusing', 'the coloured markings helped me to remember'*	HM: *'the voices in the presentation, and also the explanations of the teacher are important; they helped me to understand the subject matter'.*	HM: *'when we read the sentences out loud, it helped me to understand the subject matter, when I copied the rules from the presentation, it helped me to understand'.*	HM: *'it was fun to work in the exercise book, it helped me to concentrate'*

Summary: According to the remarks by the pupils in the group with R preference, the Visual element of the lesson combining different learning styles did not hinder their learning; on the contrary it assisted them making it easy for them to understand. These elements attracted their attention, helping them concentrate and remember.	Summary: In all, it seems from the pupils' remarks that the voices did not hinder them, although two of them said that the teacher's explanations were unnecessary	Summary: the pupils in the R group were not hindered by the Reading/writing element in the lesson	Summary: it seems that the work in the Kinaesthetic exercise book assisted the pupils in group R, except for HO.

Summary of Findings for Group R

Although their preferred learning style was R they were not hindered by Visual, Auditory, and/or Kinaesthetic elements of the combined lesson. Strikingly they were not hindered by any of the elements, writing that included exercises in the exercise book also did not hinder them however, copying rules sometimes bothered them.

There were those who were not only not hindered by elements from styles other than their own but claimed that they assisted them. For example: HO said: *'the animation and the voices helped me to concentrate'*. HO is also a pupil who dares to voice his opinions, even if they differ from what is conventionally accepted and thought. None of them said that the teacher's explanations were unnecessary and only HO said that the work in the exercise book hindered him and was boring. Writing rules in the exercise book – sometimes hindered them.

HL said: *'the voices didn't help'*, reading out loud did not help her, but the voice of the teacher didn't hinder her. HL is a very skilled pupil, who said during the interview *'there's no need for this type of learning'*. In the researcher's opinion she said this since she is able to study easily using any method, and it seemed a waste of time for her, therefore she said that the voices and writing did not help her although the teacher's voice did not hinder her. While the work in the exercise book was seen by them as essential and important and helpful, copying the rules was considered boring.

Data collected at this stage from the other groups (the VARK group, the A Group and the Group with 3 pupils with different styles) were analysed in a similar manner and the summaries regarding each group appear in Appendix 5.2.

Following Stage C and after studying the data that this stage produced the researcher decided to continue to the next stage in order to break down the interviews into smaller parts, for example: the remarks relating to the Auditory element that included the teacher's words were detached from remarks about the Auditory elements from the presentation and the researcher examined them separately. Entering these new criteria into a table sharpened understanding at this stage.

5.3.4 Stage D

At this stage the researcher decided to create a table of criteria (Table 5.8 shown in Appendix 5.3: Categorising Pupils' Interview Expressions) derived from the interviews as follows:

Each pupil was assigned five lines in the table, these lines were ascribed to the letters representing the different learning styles elements of the lesson, V, A, a, R, and K, indicating:

- V - a Visual element that appeared in the experimental lesson
- A - an Auditory element represented by voices in the presentation that appeared in the experimental lesson
- a - an Auditory element represented by the teacher's voice during the experimental lesson
- R - a Reading/writing element that appeared in the experimental lesson
- K - a Kinaesthetic element that appeared in the experimental lesson

The table has 3 columns:

- The first column includes the element that appeared in the lesson: V, A, a, R and/or K.
- The second column displays expressions taken from the pupils' interviews that reflect their experience of the element as a hindrance to their learning. For

example, EY, whose learning style is diagnosed as VARK says: *'when there were too many pictures I couldn't quite succeed in paying attention to the subject matter'*, this related to the hindrance caused for EY during the use of a Visual element in the lesson. His expression is therefore recorded in the second column in alignment with the letter V for a Visual element in the first column

- The third column contains expressions from the interviews that reflect their experience of the element as assisting their learning. For example: HM who was diagnosed as having an R learning style said: *'emphasising the words with colours showed us how to remember and understand better'*. Since this related to a Visual element in the lesson this expression was recorded in the second column aligned with the V in the first column.

Example of Categorisation of Expressions from Pupils' Interviews

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting hindrance due to the discussed element	Expressions reflecting assistance due to the discussed element
HM: R	V		*'They attracted attention, I concentrated more. Emphasising of the words with colours showed us how to remember and understand better. . The funny pictures attracted attention.'*

The completed table appears in Appendix 5.3

5.3.5 Stage E

After examining the above-mentioned Table 5.8 (Appendix 5.3: Categorising Pupils' Interview Expressions) the researcher decided that she needed to create a new table with symbols, (Table 5.9 below) something more visual, instead of

words, in order to try to create a clearer picture of the data, and to organise the main points as summarised below, the use of symbols was taken from road signs:

- a square indicates something positive – this was used to enclose the letter representing the style that helped the pupil, e.g. [A] would mean that the Auditory element of the lesson helped the pupil
- a circle indicates something forbidden – in this case it was used to enclose the letter representing the style that hindered the pupil, e.g. (V) would mean that the Visual element of the lesson hindered the pupil
- a letter (V, A, A, R or K) standing by itself but crossed out in the middle would mean that this style had not helped the pupil, e.g. ~~V~~ means that the Visual element of the lesson did not help the pupil.

Table 5.9: Figurative Representation of the Effect of the Teaching Elements for each Pupil

Pupil name	Pupil's Style	Visual element in lesson (V)			Auditory element in presentation (A)			Teacher's Auditory explanation (a)			Reading/writing element during lesson (R)			Kinaesthetic element in lesson |(K)		
		Help	no help	hinder	help	no help	hinder	help	no help	hinder	help	no help	hinder	help	no help	hinder
HM	**R**	[V]	~~V~~		[A]					(a)	[R]			[K]		(K)
HO	**R**	[V]									[R]		(R)			(K)
HL	**R**	[V]	~~V~~			~~A~~			~~a~~		[R]	~~R~~		[K]		
EY	**VARK**	[V]		(V)	[A]	~~A~~	(A)	[a]			[R]		(K)	[K]		
FZ	**VARK**	[V]	~~V~~		[A]						[R]	~~R~~		[K]		
JP	**VARK**	[V]		(V)	[A]			[a]			[R]			[K]		
FB.	**VAR**	[V]			[A]			[a]			[R]		(R)	[K]		

Pupil name	Pupil's Style	Visual element in lesson (V)			Auditory element in presentation (A)			Teacher's Auditory explanation (a)			Reading/writing element during lesson (R)			Kinaesthetic element in lesson |(K)		
		Help	no help	hinder	help	no help	hinder	help	no help	hinder	help	no help	hinder	help	no help	hinder
	K															
FC	**VARK**	v						a			R			K		
GJ	**VARK**	v				~~A~~		a			R			K		
GG	**VARK**	v		v	A			a			R		R	K		
GI	**VARK**	v		v	A			a			R			K		
GF	**VARK**	v	~~V~~					a		a	R				~~K~~	
FA	**VARK**	v						a			R			K		
FD	**K**	v		v	A	~~A~~		a					R	K	~~K~~	
EX	**K**	v		v	A			a			R			K		
GH	**VK**	v			A		A		~~a~~		R		R	K		
HN	**VAR**	v		v		~~A~~		a			R		R	K		
HK	**VAK**	v			A			a			R		R	K		
JP	**A**	v		v	A			a			R	~~R~~		K		
FE	**A**	v		v					~~a~~	a		~~R~~		K	~~K~~	

However, when the data were collected in Table 5.9 above, it was revealed that many of the pupils related to a particular element as both helping and hindering them, for example PA whose learning style was diagnosed as R (see Table 5.9, second row) said that the element representing the reading and writing component of the lesson helped him but also hindered his learning. The researcher again studied the interview with FB and found that he had said: *'Yes, the reading voice in the presentation helped me'* and later, when asked whether the writing helped or hindered him, and whether writing the rules helped him, said: *'It was annoying, perhaps it helped me to understand, but being occupied with pencils and writing, hindered me and also interrupted the presentati*on'. This fact that a pupil could provide contradictory responses regarding the influence of an element representing a particular learning style used in the experimental lesson, such as Reading/writing (R) necessitated the creation of a further criteria table (Table 5.10 below) that would collate the data from the interviews in a more detailed way and would not suffice with a division into 'assisted' or 'did not assist' or 'hindered'.

5.3.6 Stage F

The researcher therefore created a new table, Table 5.10 below with criteria which were collected from the pupils during the interviews, including questions by the researcher and responses by the pupils. For example: The pupil HM was asked: 'You learnt new material with the help of the presentation, were there things in the presentation that hindered your concentration and ability to absorb the subject matter? From this question the criterion 'assisted – concentration and listening' was derived.

The criteria used in this stage**:**

- Assisted –concentration and listening
- Assisted – understanding the subject matter
- Assisted - mastering the subject matter and remembering it
- Assisted –simplifying the subject matter
- Assisted – strengthening confidence and for the pupil's self-check: have I really mastered the studied subject matter?
- Assisted – caused pleasure

It is important to note that each pupil was asked in the interview to relate to all the elements of the styles V, A, a, R and K, which were included in the experimental lesson and responded with regard to them so that the new table, Table 5.10, was divided into 4 cells for each pupil in order to allow space for answers by the pupil relating to each of the four learning styles, V, A (including a), R and K:

Explanations for Table 5.10 displayed below

Each element that appeared in the experimental lesson was marked with the appropriate letter in the appropriate colour: V A R K

V in red – for Visual elements that appeared in the lesson

A in green for Auditory elements that appeared in the lesson

R in blue for elements of Reading/writing in the lesson

K in turquoise for the Kinaesthetic elements in the lesson

A box filled with the colour symbolising one of these elements indicates that the element assisted the pupil, or did not hinder the pupil. This data is derived from the part of the interview in which the pupil relates to the Visual, Auditory, Reading/writing or Kinaesthetic part of the lesson and says whether the element assisted or hindered their learning.

A filled red cube indicates that the Visual element of the experimental lesson assisted the pupil's learning. For example FZ said: *'I also liked the pictures and because of the pictures I continually listened all the time and watched the presentation*. In other words the Visual element of the lesson (presentation pictures) helped FZ to concentrate and listen. Thus, in Table 5.10, a filled red cube was entered in the column entitled 'helped the pupil to concentrate and listen' in the row assigned to the pupil FZ.

An empty box in which is inscribed a letter symbolising one of the elements in the lesson indicates that this element (in the example in the left column: the Visual element) did not assist the pupil's learning. In the case of JQ, she remarked: *'exactly the opposite, it was beautiful, the animation but it interfered with my concentration, It isn't easier when there are pictures, and they're just pictures.'*

Thus: when an element in the lesson was experienced by the pupil as assisting learning and/or did not hinder learning, the following symbols were inscribed in the appropriate column and line.


Indicates that a Visual element (V) in the lesson was experienced as assisting and/or did not hinder learning


Indicates that an Auditory element (A) in the lesson was experienced as assisting and/or did not hinder learning


Indicates that a Reading/writing element (R)in the lesson was experienced as assisting and/or did not hinder learning


Indicates that a Kinaesthetic element in the lesson was experienced as assisting and/or did not hinder learning

And when an element employed in the lesson was experienced by the pupil as not assisting or hindering the pupil's learning, the following symbols were used in the relevant column and in the row assigned to the pupil's name:


Indicates that a Visual element in the lesson was experienced as not assisting and/or hindered learning


Indicates that an Auditory element in the lesson was experienced as not assisting and/or hindered learning


Indicates that a Reading element in the lesson was experienced as not assisting and/or hindered learning


Indicates that a Kinaesthetic element in the lesson was experienced as not assisting and/or hindered learning

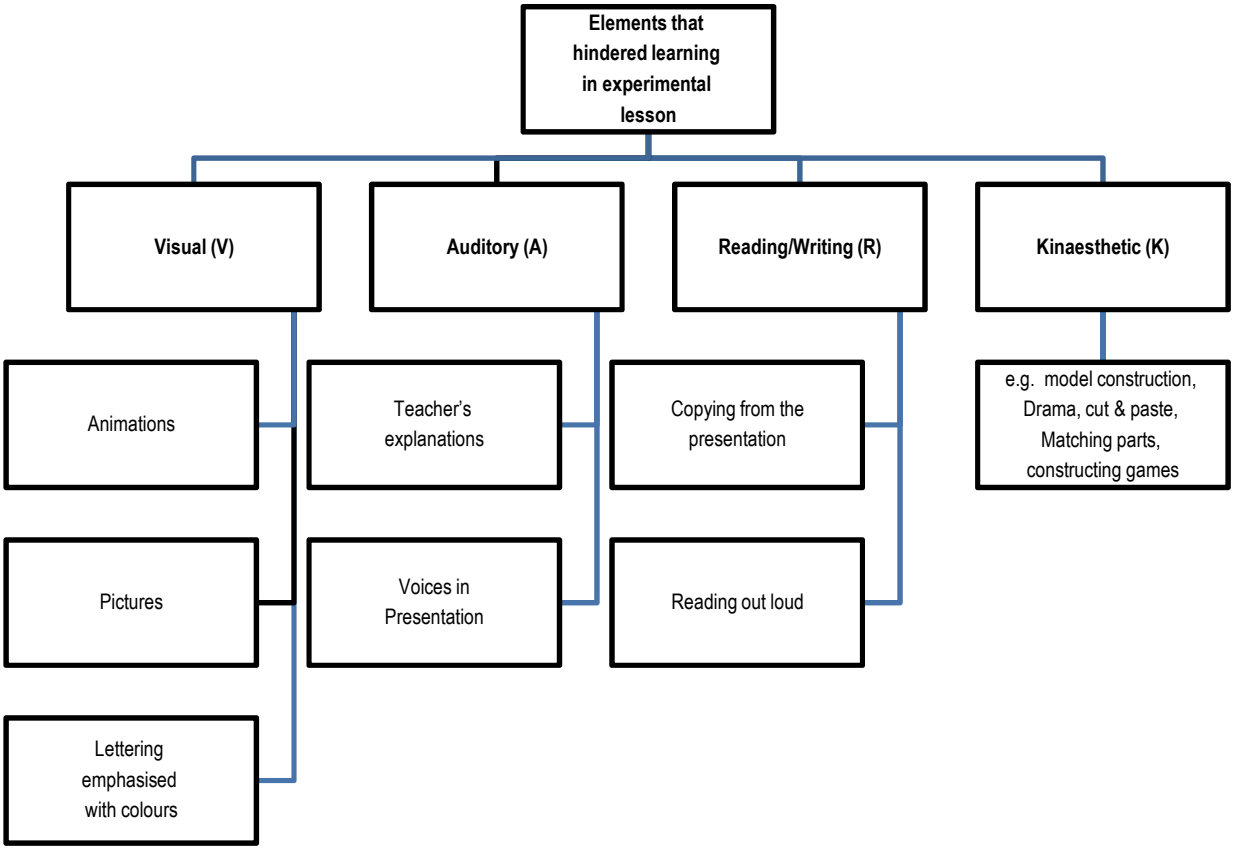

Indicates that the Auditory element of the teacher's explanations in the lesson was experienced as not assisting and/or hindered learning


Indicates that a Writing element in the lesson was experienced as not assisting and/or hindered learning

The V, A, R and K elements experienced in the lesson cannot be seen as single objects, and they must be broken down into their components which must also be considered in order to identify a more specific experience that the pupil underwent

during the experimental lesson. For example: in the interview, FZ said: *'but if the interview was interesting, especially the animations and because of the voices in the presentation I only looked at the presentation and I was focussed, I also liked the pictures, and because of the pictures, I continually listened all the time and watched the presentation, there were a lot of pictures in the presentation and it was always easier to learn when there were pictures, because I was riveted and focussed.'* But later in the interview she said: *'the emphases didn't help to understand the subject matter'*, this means that the Visual part was experienced by FZ positively, but the coloured emphases that appeared on the words were experienced as not helpful. Thus the researcher divided the elements that appeared in the lesson: V –Visual, A – Auditory, R/W – reading and writing and K – Kinaesthetic into the following categories displayed in Flow-Chart 1 below:

Figure 5.1: Learning Style Categories and Their Components



A partially filled cube indicates that there was a hindrance, unnecessary component, component that did not help or boring component. This element appeared as part of the interview in which the pupils related to the Visual or Auditory or Reading/writing or Kinaesthetic part of the experimental lesson and stated whether they had a problem with the particular component. For example FZ said in the interview: *The emphases did not help me to understand the studied subject matter.'* In other words the Visual element of the lesson (the coloured emphases of the words) did not help FZ to understand the subject matter.

Thus in Table 5.10 in the column entitled 'assisted to understand the subject matter' a box with red vertical stripes was inserted in the row assigned to FZ  so that the observer of Table 5.10 can easily see according to the coloured pattern of the box which component caused difficulties, which in the mentioned case was the Visual element of the lesson (red), but according to the key of these shadings it can be seen that it was a particular element that caused the difficulties. In the mentioned case this was the coloured emphases on the words, meaning that although she experienced the visual element of the lesson as helpful the coloured emphases of the words did not help her.

The interview transcripts recorded the pupils' words when they were asked questions and responded and also when they expressed their opinions without being asked anything specific. These expressions were used to form the criteria (components) that appear in the upper row of Table 5.10.

Assisted concentration and attention

Derived from pupils' remarks for example, when EY said: *'the voices didn't really help me to concentrate'* or GH said: '*they were funny and interesting, and they helped me to watch and listen, to taken an interest in it.'*

Assisted subject matter comprehension

Derived from pupils' remarks, for example, FZ said: *'when I read the sentences from the presentation it actually helped me to understand the subject matter better,'*

Helped to master the subject matter and remember it

Derived from pupils' remarks, for example, FZ said: *'it helps its easy; it strengthens my confidence when I understand everything.'*

Attracted attention and helped to awaken interest

Derived from pupils' remarks, for example, FZ said: *'it was interesting with the presentation, especially the animation and because of the voices in the presentation, I only looked at the presentation and I was focused, I even liked the pictures.'*

Assisted in simplifying the subject matter

Derived from pupils' remarks, for example, FB said: *'I most liked the fact that there were pictures in the presentation, it was easier to learn.'*

Helped to strengthen confidence and self-checking

Derived from pupils' remarks, for example, FA said: *'if you solve things in the exercise book you can know the subject matter better and succeed in the exam.'*

Gave pleasure

Derived from pupils' remarks, for example, JQ said: *'it was fun to copy the sentences in the note book, that way I feel that I understand.'*

Ten pupils who were diagnosed as having a VARK Learning Style

Table 5.10 below shows an analysis of the data derived from the interviews of the ten pupils diagnosed with a VARK learning style.

Table 5.10:
Analysis of Expressions of 10 pupils diagnosed with VARK style

Pupil's name	Criteria						
	Assisted concentration and listening/ OR attention	Assisted subject matter comprehension	Helped to master the subject matter and remember it	Attracted attention and helped to awaken interest	Assisted in simplifying the subject matter	Helped to strengthen confidence and self-checking	Gave pleasure
FZ		W					
EY			A R				
JQ							
FB.							
FC							
GJ	A						
GG							
GG							
GF	K						
FA							

The following are the criteria (components) derived from the pupils' statements that indicated some form of hindrance:

 - Indicates that animation hindered learning or was considered unnecessary – in the context of the Visual (V) element

 - Indicates that pictures helped but too many pictures distracted attention in the context of the Visual (V) element

 - Indicates that the coloured emphasis of words did not help learning – in the context of the Visual element (V)

 - Indicates that the teacher's explanations did not help learning or were annoying, in the context of the Auditory (A) element

 - Indicates that Auditory elements assist but loud voices in the presentation hindered in the context of the Auditory (A) element.

 - Indicates that when the pupil has already understood, this element hindered and/or wasted time – in the context of the Reading/Writing (R/W) element.

 - Indicates that when the pupil reads out loud in front of the class it hinders the pupil – in the context of the Reading (R) element.

 - Indicates that the activity usually helped but when the pupil already had command of the subject matter it was superfluous, in the context of the Kinaesthetic element (K).

 - Indicates that the activity was boring – in the context of the Kinaesthetic (K) element.

 - Indicates that a Visual element (V) in the lesson was experienced as helpful and/or did not interfere

 - Indicates that an Auditory element (A) in the lesson was experienced as helpful and/or did not interfere

 - Indicates that a Reading/writing element (R) in the lesson was experienced as helpful and/or did not interfere

 - Indicates that a Kinaesthetic element in the lesson was experienced as helpful and/or did not interfere

 - Indicates that a Visual element in the lesson was experienced as unhelpful and/or interfered

 - Indicates that an Auditory element in the lesson was experienced as unhelpful and/or interfered

 - Indicates that a reading element in the lesson was experienced as unhelpful and/or interfered

 - Indicates that a Kinaesthetic element in the lesson was experienced as unhelpful and/or interfered

 - Indicates that the Auditory element of the teacher's explanations n the lesson was experienced as unhelpful and/or interfered

 - Indicates that a writing element in the lesson was experienced as unhelpful and/or interfered.

Table 5.10 above shows clearly that, during their interviews, all the pupils related to all the different learning styles: Visual (V), Auditory (A), Reading/Writing (R) and Kinaesthetic (K).

In each pupil's line appear boxes in all four colours signifying that their expressions related to these teaching styles (red, green, blue and turquoise signifying V, A, R or K) whether the box is filled or partially filled. These symbols reflect responses to questions and unsolicited opinions.

Analysis of the interview findings showed that these pupils diagnosed with VARK style felt that they had been assisted in their learning by all four elements of the lesson V, A, R and K as follows:

- V – 21 filled boxes – indicated the pupil was assisted by the Visual element of the lesson.
- A – 17 filled boxes – indicated the pupil was assisted by the Auditory element of the lesson
- R -12 filled boxes – indicated the pupil was assisted by the Reading/Writing element of the lesson
- K - 15 filled boxes – indicated the pupil was assisted by the Kinaesthetic element of the lesson.

From the analysis of the interviews, indicated in Table 5.10 by the partially filled boxes, it is clear that the pupils diagnosed with VARK style felt they had been hindered during the lessons by V, A, R and K elements as follows:

6 boxes indicated that no assistance was obtained (the boxes bordered by a coloured frame with a letter within indicating the element), 2 for the Auditory element, 2 - Reading, 1 - Writing and 1 – Kinaesthetic. **Interestingly, the Visual element was not mentioned as hindering learning**.

To summarise, there were 71 remarks expressing assistance or hindrance, only 6 of them related to hindrance i.e. 8% of all such expressions.

The partially filled boxes in Table 5.10 (symbolising hindrance, unnecessary element, unhelpful element, of a boring element) indicate that although the element itself helped, one of its components was problematic. For example the claim that the Visual element helped yet one of its components – the coloured emphases – constituted a hindrance.

There were:

- V 5 partially filled red boxes indicating that a component of the Visual element was problematic.
- A 8 partially filled green boxes indicating that a component of the Auditory element was problematic.
- R 3 partially filled blue boxes indicating that a component of the Reading/Writing element was problematic.
- K 1 partially filled turquoise box indicating that a component of the Kinaesthetic element was problematic

Deeper examination of Table 5.10 shows that of those expressions relating to the Auditory element, only 1 related to loud voices in the presentation and all the others related to **difficulties due to the teacher's oral explanations**. 5 pupils spoke about a particular component within the Visual element that hindered them, such as the coloured emphases or the animation but in general they were not hindered by the Visual element of the lesson.

Note: In the following analysis the statement that pupils related (or did not relate) to a particular issue, refers to the fact that they either responded (or did not respond) to a direct question or gave their self-initiated opinion.

Which of the Elements (V, A, R and/or K) that appeared in the Lesson, were perceived by the Pupils diagnosed with VARK Learning Style as <u>enhancing their concentration and attention</u>

In the column entitled 'assisted concentration and listening/OR attention' in Table 5.10, it can be seen that 9 pupils related to this question (either in response to a direct question or as their self-initiated opinion). 8 pupils related to the Visual element as an element that they felt helped them to concentrate and listen (in this column there appear four red filled boxes and

4 empty red boxes – with letters in them) with the reservation that animations hindered them or that the pictures were unnecessary. In sum the pupils diagnosed with VARK learning style felt that the Visual element helped them to concentrate and listen to the lesson.

7 pupils from the VARK group related to the Auditory element, 5 of them felt that the Auditory element helped them to concentrate and listen, 1 felt that it hindered and 1 said that the loud voices troubled him.

5 pupils from the VARK group related to the Reading/Writing element, 2 of them felt that this element helped them to concentrate and listen, 2 said that the teacher's voice disturbed them and 1 said that the loud voices in the presentation were frightening.

6 pupils from the VARK group related to the Kinaesthetic element, 5 of them felt that this element helped them to concentrate and listen while 1 pupil claimed that the Kinaesthetic element did not help him to concentrate and understand.

It appears that when the VARK group did work by themselves such as Reading/Writing or Kinaesthetic work, it gave them a sense of capability, since they said that it helped them to concentrate and listen.

Which of the Elements (V, A, R and/or K) that appeared in the Lesson, were perceived by the Pupils diagnosed with VARK Learning Style as assisted subject matter comprehension?

Study of the column 'assisted subject matter comprehension' in Table 5.10 reveals that all the pupils in this group related to this issue.

5 of them related to the Visual elements, which they felt had assisted them to understand the studied subject matter (this is indicated by 4 red filled cubes and one striated red cube in the column 'helped to understand the subject matter'). With one reservation by FZ that *'the coloured emphases were unnecessary',* it emerged that the VARK group felt that the Visual elements of the presentation assisted their understanding of the studied subject matter.

8 members of the VARK group related to the Auditory elements, 4 of them felt that the Auditory element (A) helped them to understand the studied subject matter, while 4 others had reservations and felt that their understanding of the subject matter had been hindered by the teacher's oral explanations (a) (see the striated green cubes).

8 pupils from the VARK group related to the Reading/Writing element, all of these pupils felt that the (R) element had helped them to understand the studied subject matter.

3 pupils from the VARK group related to the Kinaesthetic element, they felt that the (K) element had helped them to understand the studied subject matter, but FZ noted that she felt that it *'usually helped but when I already had command of the studied subject matter, it was unnecessary'*.

Which of the Elements (V, A, R and/or K) that appeared in the Lesson, were perceived by the Pupils diagnosed with VARK Learning Style as helped to master the subject matter and remember it?

Study of the column, 'helped to master the subject matter and remember it' in Table 5.10 reveals that 8 of the pupils from the VARK group related to this issue).

3 members of the VARK group related to the Visual elements and felt that it helped them to master the subject matter and remember it (in the column, 'helped to master and remember the subject matter' 3 filled red cubes appear). This means that the pupils from the VARK group who related to the (V) elements in the presentation felt that it helped them to master and remember the subject matter.

1 VARK group member, EY, related to the Auditory element, he felt that it had not helped him.

1 VARK group member, EY, related to the Reading/Writing element, again he felt that the (R) element had not helped him.

7 members of the VARK group related to the Kinaesthetic elements, they felt that the (K) elements helped them to master the subject matter and

remember it. This seems to indicate that when the pupils work and succeed, it gives them a sense of capability.

Which of the Elements (V, A, R and/or K) that appeared in the Lesson, were perceived by the Pupils diagnosed with VARK Learning Style as attracting their attention and helping to awaken their interest?

Study of the column: 'attracted attention and helped to awaken interest' in Table 5.10 reveals that 4 of the pupils from the VARK group related to this issue.

3 of these pupils related to the Visual elements and felt that they had attracted their attention and helped to awaken their interest (in the column 'attracted attention and helped to awaken interest' there were 3 filled cubes)., meaning that the pupils in the VARK group felt they were helped to concentrate and listen by the (V) elements in the presentation.

None of the pupils related to the Auditory elements of the lesson.

2 members of the VARK group related to the Reading/Writing element and felt that it attracted their attention and awakened their interest (two filled green cubes).

None of the members of the VARK group related to the Kinaesthetic element with regard to this question.

Which of the Elements (V, A, R and/or K) that appeared in the Lesson, were perceived by the Pupils diagnosed with VARK Learning Style as assisted in simplifying the subject matter?

Study of the column, 'helped to simplify the subject matter' in Table 5.10 reveals that only 4 of the pupils from the VARK group related to this issue.

3 of them related to the Visual element and felt that it helped them to simplify the subject matter and one pupil, JQ noted that the teacher's explanations: the Auditory element (a), hindered the simplification of the subject matter.

Members of the VARK group did not relate to the Auditory, Reading/Writing or Kinaesthetic elements of the lesson in relation to this question.

Which of the Elements (V, A, R and/or K) that appeared in the Lesson, were perceived by the Pupils diagnosed with VARK Learning Style as helping to strengthen confidence and self-checking?

Study of the column, 'helped to strengthen confidence and self-checking' in Table 5.10 reveals that only 5 of the pupils from the VARK group related to this issue.

4 of them related to the Kinaesthetic element as something that helped to strengthen their confidence and to self-check their mastery of the subject matter, while 1 pupil, FB noted that the Auditory element (a), the teacher's oral explanations hindered his learning.

The members of the VARK group did not relate to the other elements of the lesson (V, A and R) in relation to this question.

Which of the Elements (V, A, R and/or K) that appeared in the Lesson, were perceived by the Pupils diagnosed with VARK Learning Style as giving pleasure?

Study of the column, 'gave pleasure' in Table 5.10 reveals that only 4 of the pupils from the VARK group related to this issue.

3 of these pupils related to the Visual elements of the lesson and felt that they gave them pleasure, one pupil, JQ noted that the Reading/Writing element gave him pleasure.

The members of the VARK group did not relate to the other elements (A, a or K) in relation to this question.

Summary: Findings for Members of the VARK group

This stage of the data collection and analysis enabled an observation of the pupils' expressions of their experiences in the research lessons, both a general overview and a view of the details of the assistance/hindrance that the pupils experienced. In other words: which of the learning elements assisted or hindered the pupils' learning.

Here it can be seen that each of the elements employed in the lesson that included teaching according to different learning styles was experienced by the pupils diagnosed as having a VARK learning style as contributing to their learning, while the Visual element that included pictures, animation and coloured emphases was felt to provide the most significant assistance. Although there were expressions indicating that the Auditory, Reading/Writing and Kinaesthetic elements hindered their learning, these expressions were insignificant and constituted only 8% of all expressions relating to the elements. It is interesting to note that none of the expressions indicating hindrance related to the Visual element.

Examination of the expressions indicating a hindrance due to a particular component of one of the elements (V, A, R or K) clarifies that the element component that was seen as most obstructive was the oral explanation of the teacher (element A) when the teacher stopped the screening of the presentation and explained things orally to the pupils. Only one pupil was hindered by the loud voices in the presentation (also element A).

The Visual element was felt to be the most significant for these pupils helping them to concentrate and listen, nevertheless there was a reservation concerning one component of the Visual element, which either did not really help or was felt to be too onerous, for example: '*the animations interfered*'.

This element (V) also gave pleasure to several pupils, helping them to understand the studied subject matter, to awaken their interest and to simplify the subject matter.

The members of this group felt that the Auditory element helped them to understand the subject matter with the reservation regarding the teacher's oral explanations, and that it helped them to concentrate and listen.

They felt that the Reading/writing element mainly helped them to understand the subject matter. They felt that in the main the Kinaesthetic element helped them to master and remember the subject matter, also several members of this group found that this activity gave them a sense of confidence and helped them to test themselves and to concentrate and listen.

The pupils diagnosed with a VARK learning style that included all the elements did indeed feel that the lesson which included all the different teaching styles helped them to learn especially the Visual element, although they were hindered by the teacher's oral explanations.

The findings for the R group and the A group and the group that included 3 pupils with different learning styles were similarly analysed and can be found in Appendix 5.4

5.3.7 Stage G

Data that emerged from the interviews with the pupils testified to motivation. This data related to three main categories:

1. A sense of autonomy, for example: *'I have a choice', 'I liked it', 'it interested me', 'I found it interesting – it awakened a feeling and desire to continue to act with regard to that matter' 'because I found it interesting, I felt that I wanted to continue to watch the presentation, to continue to work with this matter'*.
2. A sense of competence, efficacy, for example: *'its easier', 'understand better', 'helped me to concentrate', 'strengthened confidence'*, the emphases and voices were important for him, he speaks about preferences that helped him, *'they helped me to concentrate', 'I feel that I understand'.*
3. A sense of relatedness, for example: *'the teacher is important for me, my parents, the teachers, the pupils, even my mother says that its important to do exercises – I want to feel part of my family, because my family think my studies are important. I understood better when the teacher explained*'. He testified to the need for a relationship with the teacher, (teacher-relatedness) and a sense of capability when the teacher is in the vicinity. *'everyone is quiet and concentrating on the subject matter'* – testifying to the relationship (relatedness) with other pupils (peers)and two types of motivation

4. Internal motivation, for example: *'its fun, interesting', 'they're funny, interesting, its most successful'.*
5. External motivation, for example: *'I think this is beneficial, exercising is important and it also helps'* the relationship with the teacher is important and this also testifies to external motivation *'that's how we understood what we should pay attention to'*.

Expressions that testified to a sense of competence and efficacy are presented in the following tables that were prepared originally at Stage D and expanded to include analysis of these expressions of assistance in the centre column (instead of the original column including expressions of hindrance). Table 5.17 – Example below provides a single example of the analysis of the interview of one of the pupils. Similar data analysis was conducted for each of the participant pupils and this data appears in the extension to the table (Table 5.17 – Complete in Appendix 5.5: Analysis of Interview Data at Stage G.

Table 5.17 - Example: Analysis of Interview Expressions indicating Assistance for Learning from the Experimental Lesson by Categories of Motivation

(Table is divided into sub-tables for each pupil)

Key for tables

V – Visual element,
A – Auditory element,
a – Auditory element (teacher's oral explanations,
R – Reading/writing element,
K – Kinaesthetic element

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting a sense of belonging, autonomy, competence, efficacy, relatedness, external motivation or internal motivation	Expressions reflecting assistance from the discussed element
HM: R	V	Sense of autonomy Sense of efficacy Sense of autonomy	*'They attracted attention, I concentrated more.* *Emphasising of the words with colours showed us how to remember and understand better.* *The funny pictures attracted attention.'*
	A	Sense of autonomy, internal motivation.	*'They attracted attention.'*
	R	Sense of efficacy	*'They helped me very much to understand the subject matter. . I felt that it was easier to write, because I really understood, I shall certainly remember the rules better.'*
	a	Sense of relatedness, testifying to a need for a relationship with teachers and parents Sense of efficacy Feeling of autonomy Sense of efficacy	*'We're used to hearing explanations from the teacher;* *I went over it by heart and understood it better. .* *I noticed things that I hadn't paid attention to during the presentation.* *When there are examples it's easier for me to understand and remember the subject matter.'*

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting a sense of belonging, autonomy, competence, efficacy, relatedness, external motivation or internal motivation	Expressions reflecting assistance from the discussed element
	K	Sense of autonomy, internal motivation Sense of efficacy Sense of relatedness	*'its fun, it helps me to concentrate on the subject matter.* *Again we focus on the material and it helps us to understand.* *My mother also says it's important to do exercises.'*

The sample table above was analysed as follows:

HM (R)

Consideration of V, R and a: Testified that this granted her/ built her/ gave her a sense of efficacy: *'I concentrated more', 'to remember and understand better', 'I felt it was easy for me', ' I really understood' 'I'll remember better', 'its easy for me to understand and remember'.*

Consideration of A, V and K testified to internal motivation: 'attracted attention', 'fun'.

The category (a): testified to the need for a connection with the teacher and parents: *'We're used to hearing explanations from the teacher', 'understood it better', 'I noticed things that I hadn't paid attention to', 'the examples helped', 'my mother also says its important to do exercises'.*

HM's expressions testified to a sense of efficacy, a sense of relatedness and internal motivation.

5.3.8 Stage H

Table 5.17 above presents the pupils' expressions pointing to their positive experiences in the experimental lessons, and also indicating how these expressions reflected motivation of different types. Yet even these tables do not clearly show which elements of the teaching styles used in the experimental lesson (V, A, a, R and K) contributed to the pupils' sense of

efficacy, sense of autonomy, sense of relatedness, internal and external motivation. The researcher therefore turned to Stage H in which she constructed new tables from these tables in the following way:

For each expression by a pupil that reflected concepts of motivation (sense of efficacy, sense of autonomy, sense of relatedness, internal and external motivation) the relevant letter indicating the element of the lesson to which this expression referred (V, A, a, R or K) was recorded in the line for that pupil. These symbols for the expressions were derived from the individual sections of Table 5.17 above, so that it is now possible in Table 5.18 below to see for each pupil which element of the lesson allowed them to experience the above-mentioned motivational concepts.

When Table 5.18 was completed, the researcher prepared a summary for the different learning style groups in order to try to see whether the combination of teaching styles had helped the pupils with a particular learning style and in what manner it had helped them.

Table 5.18:

Coordination of Teaching Styles with Concepts of Motivation

(according to pupils' expressions reflecting assistance)

(Table is divided into sections for each Learning Style Group, summaries appear after each section)

Pupils with VARK learning style										
Pupil's name	Sense of efficacy		Sense of autonomy		Sense of relatedness		Internal motivation		External motivation	
EY			V			a				
	K	R							K	
FZ	V	a	V			a	V	A		
	K	R								
JQ	V	a		A		a				
	K	R			K					
FB	V	A				a	V			
	K	R	K							
FC	V	a								
	K	R								
GJ	V	a	V			a	V			
	K	R								
GG	V	A				a				
	K	R								
GI	V	A				a				
	K								K	
GF	V	a								
		R								
FA	V	a				a				
	K	R			K					

Summary for Pupils with VARK learning Style

As can be seen from Table 5.18 above all the elements of the teaching styles included in the experimental lesson contributed especially to the sense of efficacy and autonomy of the pupils in the VARK group.

Although the presentation, in which the different teaching styles were expressed constituted a substantial part of the research lesson and the teacher stopped the presentation to explain the subject matter in her own words, it can be seen clearly from the above table, Table 5.18 that the pupils felt a need for the relationship with the teacher, and that their sense of self efficacy often depended on this relationship (Wehlage, 1989). Is this due to habits that they have adopted over years of contact with this meaningful focal figure in their studies? Or do the pupils really need a focal figure for their learning, and is it this sense of relatedness that is important in supporting the sense of efficacy regarding their studies. The Visual part of the experimental lesson only contributed to the internal motivation of some of the pupils and the Kinaesthetic part of the lesson contributed to the external motivation of a few pupils, it was important to them to perform things in order to prepare for and succeed in exams.

A similar analysis according to the same table was conducted for the other learning style groups (the R Group, the A Group and the group with three pupils with different learning styles) these analyses can be found in Appendix 5.6: Analysis of the Interviews at Stage H.

5.4 Summary of Analysis of Data from the Interviews according to Research Stages

Stage A – data collection: reading the interviews and marking expressions of emotion as distinguished from thinking that enabled the researcher to obtain her first impressions of the data.

Stage B – data collection: marking the initial text with colours (Appendix 5.1: Annotated Transcripts of the Interviews) according to the following key: green – 'assisted learning', red – 'hindered learning' and purple – considered

'important' by the pupil. This helped the researcher to observe the data according to colours and see the mass of green that indicated assistance in contrast to the mass of red that indicated a hindrance or the purple that indicated what the pupils considered important. It seems that from a quantitative aspect there were more expressions reflecting the pupils' sense that they had been helped by the experimental lessons than expressions of hindrance or importance, but it was not yet possible to see what it was in the elements (V, A, R and K) that the pupils with a particular learning style felt helped or hindered their learning.

Stage C – data collection: the researcher sorted each pupil's expressions in a sorting table according to the different teaching styles employed in the lesson to which they referred (V, A, R or K), so that it would be possible to see for each pupil which of the teaching styles helped or hindered them according to their words. The column relating to a particular teaching style now included both expressions relating to the feeling that the element had assisted learning and also expressions relating to a feeling that the element had hindered learning, therefore the researcher made rough summaries from the pupils' expressions to indicate which styles had in their opinions assisted or hindered their learning – the following are the summaries collected from this table (Table 5.2 see p. 155 and Tables 5.3-5.7 in Appendix 5.2: Analysis at Stage C):

- The R group did not report any significant hindrance due to the Visual, Auditory, Reading/writing or Kinaesthetic elements of the lesson, though there were here and there reservations.
- The VARK group were helped by all the elements used in the lesson (V, A, R and K).
- The A group indicated that when the Visual element was sparse and static it helped them to learn but when it included movement it hindered them. They felt the Auditory element was a positive experience but were annoyed by it when they had already understood something. Similarly they felt the Kinaesthetic element helped them.

- For the pupil diagnosed with a VK learning style, one element that was not included in his style hindered him but the hindrance related only to one component of the Reading/writing element. Reading did not hinder him though the writing annoyed him.
- The pupil with a VAK learning style was helped by all the elements, but when he read out loud he was absorbed in how and not what, this pupil was a new immigrant so that might explain his stage fright in front of the other pupils.
- The pupil with a VAR learning style also said that he felt embarrassed when he needed to read out loud and was not focused on the subject matter that he read. HN was not hindered by the Kinaesthetic element that was not part of his learning style.

At this stage the researcher gained a general conception of the pupils' experiences during the experimental lesson, but since the expressions of assistance and hindrance were not clearly separated, it was difficult to identify the nuances of these experiences.

Stage D – The creation of criteria for the expressions of hindrance, and expressions of assistance that appeared in the text. This time a table was constructed that also sorted the expressions according to way in which the pupils experienced the different teaching styles that appeared in the lesson (V, A, R and K), as assisting or hindering their learning. From this new table, Table 5.8 (Appendix 5.3: Categorising Pupils' Interview Expressions) the researcher gained a better picture of the expressions of assistance and hindrance experienced by the pupils in the experimental lesson, but it was still not possible to discern how the element assisted or hindered learning, nor was it possible to discern a trend regarding the different learning style groups. However the table created at this stage formed the basis for an additional analysis of the expressions relating to assistance at Stage G that sorted these expressions according to various aspects of motivation that they reflected.

Stage E: The creation of a table of graphic symbols in order to clearly see the data with more specific criteria. Consideration of each element used in the lesson (V, A, R and K) was divided according to three categories 'assisted', 'did not assist' or 'hindered'. This table clearly indicated that it was necessary to make a more accurate division, since the same pupil sometimes expressed feelings indicating that they were both assisted and hindered by the same teaching style, even saying the opposite to what they had previously said. The researcher realised that she needed to distinguish between different elements of these teaching styles which were often revealed in the pupil's more detailed explanations. Yet this table did provide a general understanding that all the pupils had been assisted by all the different elements of the lesson including the teacher's oral explanations.

Stage F – at this stage the researcher wanted to understand how the different elements assisted the pupils. She therefore created a coloured table, shown in Table 5.10 on p.169 (also Tables 5.11, 5.12, 5.13, 5.14, 5.15, 5.16 in Appendix 5.4: Analysis at Stage F) with the following criteria:

Assisted concentration and listening/ OR attention	Assisted subject matter comprehension	Helped to master the subject matter and remember it	Attracted attention and helped to awaken interest	Assisted in simplifying the subject matter	Helped to strengthen confidence and self-checking	Gave pleasure

These criteria were marked in coordination with the different elements of the teaching styles experienced during the lesson. This table now provided much information from the expressions collected in the interviews and it became possible to see trends that appeared from the data.

It was now clear that the pupils with a VARK learning style were assisted by all the elements of the lesson, but the most significant assistance came from the Visual element, that helped them especially to concentrate and listen, while the oral explanations of the teacher (a) were felt to be a hindrance; although the Auditory and Reading/writing elements were considered helpful

in understanding the subject matter. They felt the Kinaesthetic activity helped them to master the subject matter and helped them to remember it.

The pupils with an R learning style also felt they were helped by all the elements in the lesson, but for them too, the most significant assistance came from the Visual element that helped them to concentrate and listen. They too felt that the teacher's oral explanations were a hindrance although they felt that the Auditory element helped them to understand the studied subject matter.

The pupils with an A learning style also felt that they were helped by all the elements in the lesson especially the Visual element, while what hindered them was the Kinaesthetic element and when they had already understood the subject matter, this work seemed superfluous. All four elements (V, A, R and K) were considered as helping them to concentrate and listen.

The pupils with a K learning style felt they were helped by all the elements used in the lesson, especially by the Visual element. They felt that all four elements helped them to concentrate and listen while the Reading/writing element was felt to be a hindrance when they felt that they had already understood the subject matter.

The unique learning styles group, pupils who had been diagnosed with VK, VAK or VAR learning styles also experienced help from all the elements in the experimental lesson, with the most significant assistance coming from the Visual element and the Auditory element. Here too the pupils felt that all the elements helped them to concentrate and listen.

Stage G – certain expressions that emerged from the interviews testified to motivation. The researcher therefore took the table created at Stage D, Table 5.8 (Appendix 5.3: Categorising Pupils' Interview Expressions), and analysed the expressions relating to assistance according to the different concepts that they reflected: sense of efficacy, sense of autonomy, sense of relatedness and two types of motivation: internal motivation and external motivation. Additional analysis of this new table, Tables 5.17 and 5.18 above led to the insights presented here in the summary:

- Pupils with a VARK learning style and pupils with a K learning style felt that all the elements of the lesson had enhanced their sense of efficacy concerning their studies.
- It is interesting to note that pupils with a K learning style were assisted especially by the teacher's oral explanations.
- Pupils with an R learning style were assisted especially by the Visual and the Reading/writing elements which enhanced their sense of self-efficacy.
- Pupils with an A learning style experienced a sense of efficacy especially as a result of the teacher's oral explanations. It is interesting that two other pupils who had an A element in their learning style (VAK and VAR) felt that the Auditory element and especially the teacher's oral explanations contributed to their sense of efficacy concerning their studies.
- The VK, VAK and VAR group had a Visual element in common and indeed the Visual element helped them most significantly to enhance their sense of efficacy concerning their studies.

To conclude: the researcher's different stages of collection and analysis of data gave her different viewpoints concerning the contribution of the experimental lesson, composed of different teaching styles, for pupils with different learning styles. She was able to discern which elements contributed and what part of the learning they influenced and to which learning skills they contributed including the influence on different concepts relating to the pupils' motivation.

CHAPTER 6: DATA COLLECTION AND ANALYSIS FROM OBSERVATIONS IN LESSONS WITH THE PRESENTATIONS

6.1 The Data Collection Process

To collect the research data, the researcher needed the consent of the school principal, the teachers, the parents and the pupils who participated in the study. She applied to all concerned parties, and explained the nature of the study and its ethical considerations (as explained at length in Section 3.8: Ethics). All parties gave their consent and this allowed the researcher to begin to implement the experimental lessons, and at the same time to collect the data.

Data was gathered from four sources: observations, questionnaires, interviews with teachers and interviews with pupils. The present chapter relates to data collected from the observations.

6.1.1 Location in which observation data were collected

The researcher observed the lessons in three classes: one class in Year 6 and two classes in Year 5. The observations were conducted over the period of one school year beginning in September 2004 and continuing until mid-March, 2005. Due to Jewish festivals at the beginning of the school year, it was only possible to perform the research data collection from 22nd October 2004. Other constrictions including holidays, trips, exams, preparations for end of year celebrations (see Section 2.1 explaining the context of the school organisation and learning content) and the researcher's personal constrictions restricted the timing of the observations.

Each observation lasted 45 minutes. In all 12 observations were conducted in Year 6; 11 observations in Class 5A and 11 observations in Class 5B. As already described above, the researcher and a colleague teacher created purpose-built lessons in order to teach with the aid of multiple teaching styles. They constructed an interactive multimedia presentation that

combined the use of Visual, Reading/Writing, and Auditory elements, as explained above which were accompanied by the teachers' oral explanations (see Section 3.9.9: Description of a Lesson). Following the 45 minutes lesson with the presentation the pupils conducted Kinaesthetic work in their exercise books for an additional 15 minutes.

The researcher arrived in the classroom approximately an hour before each lesson began, bringing a computer from the computer room placed on a trolley constructed specially for these lessons. She set up the projector, connected it to the computer, spread out the special screen and prepared the desks and chairs in a special order so that it all the pupils would have a clear view of the computerised presentation. She then closed the curtains, lit the air conditioner and the classroom was ready for the pupils who would arrive after their break.

During the lesson the researcher sat on the left side of the class in a corner close to the blackboard, so that she could see all the pupils and the presentation and observe any reactions in the class. Since the pupils sat around the trapeze-shaped tables, the researcher could see the pupils, without any of the pupils concealing another pupil behind them (see Figures 7.2, 7.3 and 7.4 in Appendix 7.1)

6.1.2 The process of data collection from the observation

The observation in the experimental lesson was composed of two parts: The observation in the main part of the lesson with the presentation and the observation concerning work in groups with exercise books involving Kinaesthetic work following the presentation.

It should be noted that there were several differences between the different types of observation:

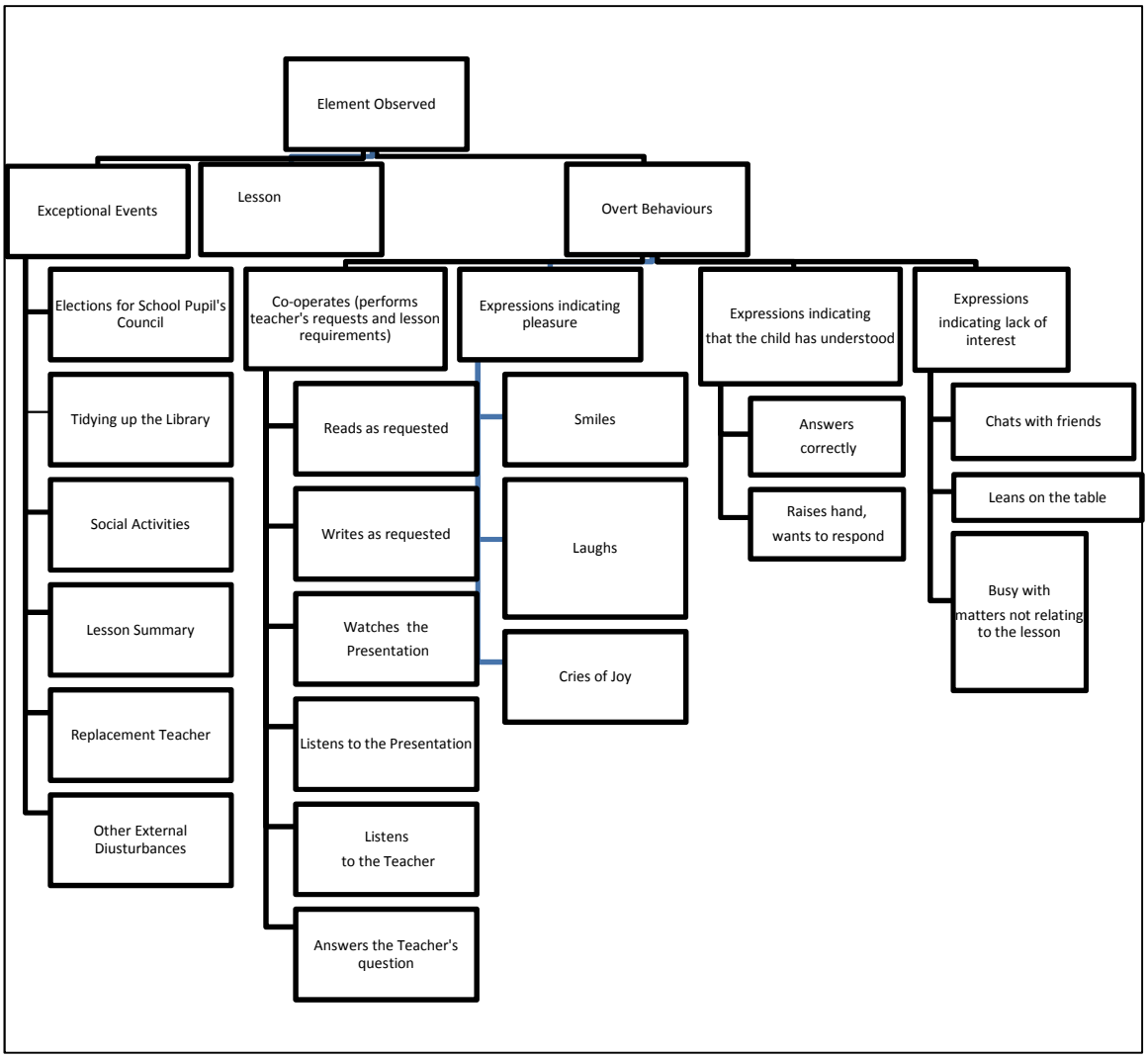
- The number of pupils observed: in the lesson with the presentation all the pupils in the class were observed simultaneously (25-27 pupils) while in the Kinaesthetic work separate groups with 3-4 pupils in each group were

observed working together. In each Kinaesthetic observation, a different group of pupils was observed.

- The pupils' activity during the lesson: in the lesson with the presentation the pupils sat in their places, listened, watched the presentation, and wrote things down in their notebooks according to the teacher's instructions. During the Kinaesthetic work with the exercise books the pupils were more active, they chatted one with the other, got up from their places and moved around the classroom.
- The teacher's role: in the lesson with the presentation the teacher had the central role. She spoke, determined the rules: when to look at the presentation, when to listen, when to write things down, when to read and who had the right to speak. The teacher was positioned at the front of the class. During the Kinaesthetic work the teacher sat in her chair and the pupils were allowed to initiate their consultation with her and show her the products of their work.
- The work of the researcher: In the lesson with the presentation the researcher sat at the front of the class and watched all the pupils. Simultaneously the researcher kept her eye on the presentation in order to categorise the pupils' reactions to the different types of occurrences there: Visual, Auditory or Reading/writing. During the Kinaesthetic part of the work, the researcher sat throughout the lesson close to a group of pupils, each lesson she sat next to a different group. It is noted at this point that in both parts of the lesson, when the researcher recorded whether the pupils engaged in learning, her observation was based on the belief that **noticeable** participation or concentration was necessary for learning.

This comparison between the types of observation indicates a significant difference engendered by the nature of the two different parts of the lesson into the observations. Flowchart 1 below shows the different matters that were observed during the lesson with the presentation with regard to each pupil's reactions to the Visual, Auditory and Reading/writing elements of the lesson.

Figure 6.1: Matters Observed during the Lesson with the Presentation



In each lesson the researcher recorded in a notebook the date and hour of the observation, with the name of the class and the name of the presentation including the events that occurred at the beginning of the lesson: what was the general mood? When did the pupils enter the classroom? And how did the teacher react to particular events that occurred (see Appendix 8.1).

The researcher recorded the events in line with the name of the pupil involved. Before the observation, she had marked the pupil's preferred personal learning style beside their name as diagnosed according to the VARK questionnaire (see description of the VARK questionnaire in Section

3.7.2) on a sheet of paper in order to be able to identify the pupils' preferred learning styles during the lesson in her observation notes.

The presentation provided a combination of all the different teaching styles in one compact learning unit, and when the teacher explained matters orally she employed an additional component of the Auditory teaching style. The teacher's oral explanation and also the part of the presentation that employed sound were marked as the use of the **Auditory** element. Working in the special activity book that included cutting, gluing and various Kinaesthetic activities was marked in the observation as a **Kinaesthetic** action. The use of the other two styles of learning (Visual, Reading/Writing) was also observed because the presentation contained specially built **Visual** elements that used movement (animation), colours and pictures. **Reading** parts were included when the pupils were asked to read aloud or silently to themselves the questions or the rules in the presentation and **Writing** parts were expressed when the teacher asked pupils to copy the rules from the presentation to their notebook, as mentioned above.

6.1.3. Stages in the collection of the observation data

Stage A

Having recorded the events during the lesson in her observation notebook, the researcher then uploaded these notes to computer files. Each class had a separate observation file and by each pupil's name was a note relating to his/her preferred learning style, as well as the observation dates and the number of the event (see Appendix 8.1).

Stage B

At this stage, the researcher outlined the events she wished to record during the lesson with the presentation (Figure 6.2 below) and prepared a mapping table, which she called the 'Lesson Events Record' (see Section 3.9.9 for a definition of 'event' that was employed in the observations). This page presented a written description of the possible events that could occur in the lesson as follows (see Table 6. 1 following Figure 6.2):

Figure 6.2: Lesson Structure for the Lesson with the Presentation

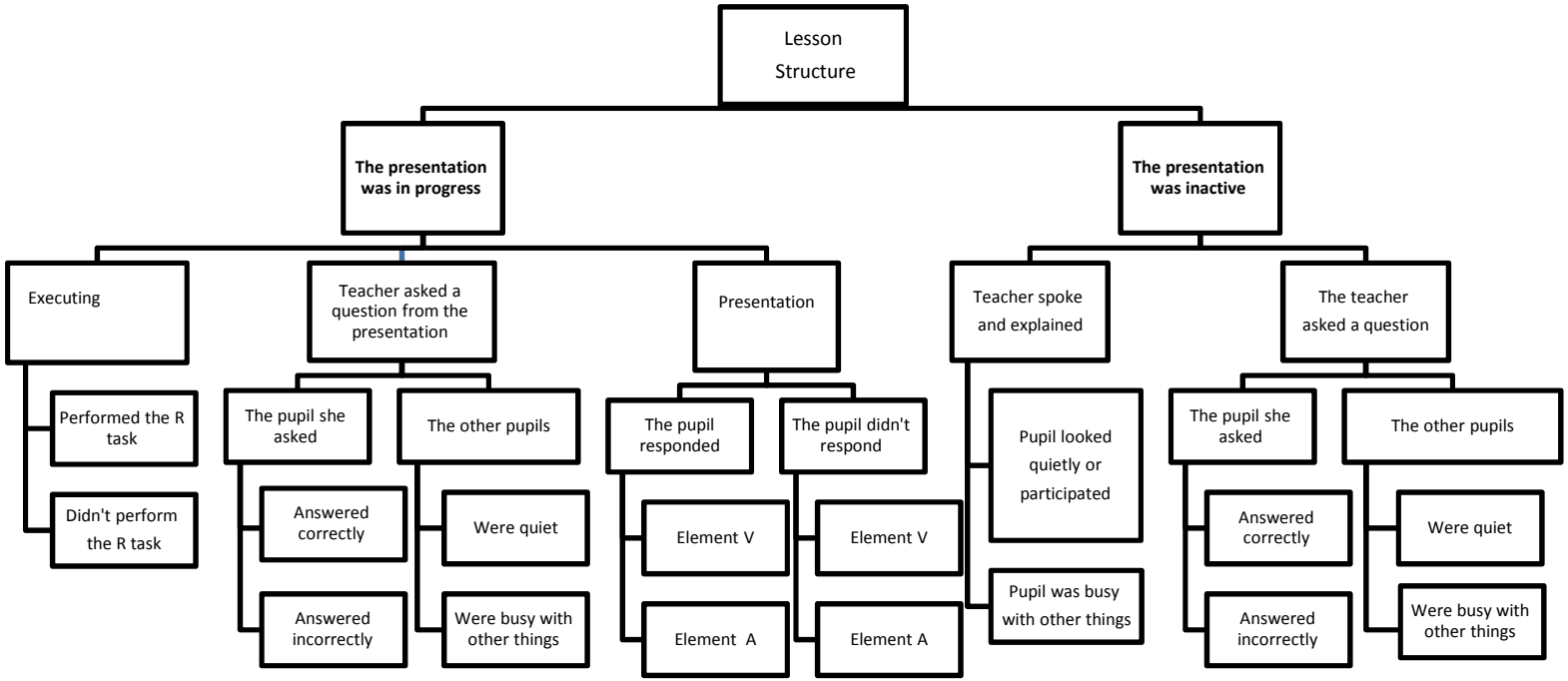


Table 6.1: Lesson Events Record for Class _____ Lesson No. _____

_

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question regarding the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things

Stage C

At this stage, the researcher employed three auxiliary resources to record the events in each observed lesson:

1. An Observation Protocol for each lesson (see Appendix 8.1)
2. The Lesson Events Record for the desired lesson (Table 6.1 above)
3. The presentation projected on this date.

Notes from the observation protocols were transferred to the Lesson Events Record in the following manner. Every event that appeared on the observation sheets was marked in the appropriate place in the Lesson Events Record. The pupil's name was entered in the appropriate cell together with their preferred learning style, followed by the place in the presentation where the event occurred. For example: The record on the observation sheet concerning the lesson that took place on 22.10.04 read as follows: *'The presentation began. Everyone was looking at the presentation except for "pupil 'V"'.* On the Lesson Events Record for the 22.10.04, the researcher marked the pupil's name and preferred learning style, K-Kinaesthetic, and in the cell for situation description the event was recorded i.e.: *'presentation running → K pupil didn't respond→Visual element'*. In other words while the Visual element of the Presentation was running the pupil ME (K learning style) did not respond. In the same manner all the events were transcribed to the pages of the Lesson Events Record (see example in Table 6.1 above).

Stage D

The following details were recorded for each of the experimental lessons:

1. Date when lesson was delivered
2. The presentations employed in the lesson
3. For each presentation: the number of events in the lesson, Visual, Auditory and Read/write events were recorded and counted, and a pie chart was created illustrating the distribution of Visual, Auditory and Read/ write events in percentages (see Graph 6.1 below).

4. The Lesson Events Record (Table 6.1 above) was completed for the lesson. The name and learning style of the pupil involved in the event were recorded in the table accompanied by an event number enabling the location of the case in the original observation papers
5. Summary of the Lesson Events Record for the lesson.

6.1.4 Stages in the analysis of the observation data

Stage E

Summary and analysis of the observations of the lesson with the presentation for all classes

The researcher collected the Lesson Events Records for all the classes and collated them into a single table. In this new table she marked the following details:

1. The number of events observed during the experimental lesson, when the pupils were asked questions during the running of the presentation.
2. The number of pupils observed responding correctly to the questions
3. The number of pupils giving incorrect answers or not knowing the answer to the questions
4. The number of exceptional events recorded for 'all the pupils in the class' and the event number (from the Observation protocol). According to this event number the researcher was able to consult the original Observation protocols to see why and to what the pupils reacted with these exceptional events.
5. An additional table was created to collate all the occasions when pupils were observed as being busy with other extraneous matters which did not relate to the presentation, as explained in Stage F below.

Stage F

At this stage the researcher created a special table to record her observations of pupils who were seen as not interested in the lesson

Table 6.2 summarising the events of non-interest during the lesson while the presentation is working

The researcher filled in Table 6.2 (below) with the names of the pupils who were observed occupied with matters not related to the teaching elements that were then employed in the presentation/lesson. Beside each pupil's name she recorded their diagnosed learning style and the events during which the pupil expressed a lack of interest concerning a particular teaching element, in order to see when a pupil with a particular learning style reacted to a particular teaching style with a lack of interest. The researcher did not relate in Table 6.2 to pupils, who expressed interest in the lesson during its delivery, this was because the researcher noticed a repetitive phenomenon when the presentation was active (and all the teaching elements were active) then all the pupils exhibited behaviour that expressed: pleasure, cooperation and understanding except for 2-4 pupils in each lesson.

At this stage the researcher wanted to investigate these pupils with the exceptional response to the presentation. The researcher also did not enter data regarding pupils who were observed as showing a disinterest in the lesson when a distracting event occurred such as the entry into the library (where the lesson was held) by pupils from another class, distribution of sandwiches etc. This was because the researcher understood that these events distracted the pupils' attention from their lesson. Additionally, she did not record the lack of interest in the presentation on several occasions when she noticed that the pupils were occupied with matters not related to the presentation for justified reasons, for example in Event 14, (see Lesson Events Record for 25th February, 2005, Event 14) because the teacher did not give the pupils sufficient time to write down the rules from the presentation yet she continued to run the presentation without noticing that the pupils were still busy writing in their notebooks..

In Table 6.2 below, the minus symbol (-) was recorded in the appropriate column in the row allotted to the pupil, indicating that the pupil was observed expressing a lack of interest in the part where of the lesson where the particular element was employed (with the above-mentioned exceptions). This symbol could and did appear in the table several times for each pupil since the pupil might be observed several times not showing an interest in the particular element, either in the same lesson or in different lessons (This table related to all experimental lessons with the presentation for the particular class). The following is an example of one such table:

Table 6.2: Table noting the Pupils' who expressed a Lack of Interest in Particular Teaching Elements (V, A or R) during the Experimental Lesson

Pupil's name and Learning Style	Presentation showing Visual element	Presentation showing Auditory element or Teacher giving Auditory explanation	Presentation showing Reading/writing element
BJ VARK	(–) (–)(–) (–)		15 (–)
BI R	(–)		(–) (–)

The researcher then examined the findings shown in these tables in order to identify any trends common to the recorded pupils.

The researcher collected all the summaries of the observations from the different experimental lessons with the presentation, collating all the Lesson Events Records (see Table 6.2 above, Table 6.3 on p. 203 and Tables 6.7-6.41 in Appendix 6.1: Analysis of Data from the Observations in the Lesson with the Presentations) and producing a summary of the obvious data that emerged from these summaries in order to see when the pupils with different learning styles reacted with a lack of interest to the lessons combing different teaching styles.

Observation Findings during Lessons with Presentation: Class F

The following is an example of the analysis of data collected from the observation findings during the lessons in which the presentation was employed.

6.2 Example of analysis of an observation in a single lesson

Data collected from Class F - lesson with the presentation (the example also appears in Appendix 6.1)

Date: 22.10.2004 Class: F Presentations: 1 and 2

Presentation1 included:

16 Visual events (see Section 3.9.9 for a definition of 'event')

10 Auditory events

12 Reading/writing events

Presentation 2 there were:

22 Visual events

18 Auditory events

10 Reading/writing events

These data are represented in the pie chart below

Graph 6.1 Events occurring in *Presentations: 1 and 2*, Class F (%)
(Also appears as Graph 6.25 in full records in Appendix 6.1)

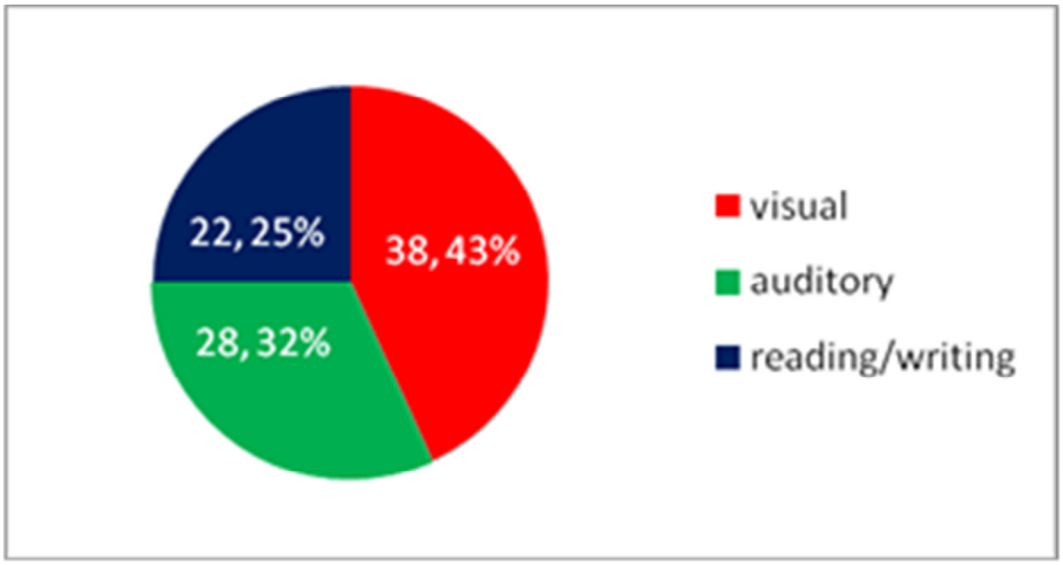


Table 6.3 Lesson Events Record for Class F on 22.10.2004 (Presentations 1 and 2) (also appears as Table 6.30 in full records in Appendix 6.1)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question regarding the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils 2						All the pupils 1	All the pupils 1	MF_RK 16		JT_R-11	ME_K 3	NM_VARK 4			MG_K 6
MG_K 14						MG_K 17		ME_K 16		OS_VAR K-11	MF_RK 3	OS_VARK 5			LC_VRK 6
								LD_VR 16		LB_VAR K-11	LD_VR3	LB VARK 7			MI_K 6
								All the pupils18		OV_R-11		MF_RK 8			MG_K 9
										MF_RK-11		OV_R 12			LC_VRK9
												JT_R 12			MI_K 10
												LC_VRK15			LB_VARK 13
												OT_VARK19			LC_VRK13

As noted, the full completed Lesson Events Records for all classes appear in Appendix 6.1 (Tables 6.7 – Table 6.41 and analysis of all twelve lessons)

6.3 Observation Findings during Lessons with Presentation: Class F

Summary of the observations during the lessons with presentations in Class F

L. was the teacher in this class; she often stopped the screening of the presentation to explain the subject matter orally to the pupils.

In all the 12 lessons reported as explained above the researcher noticed a repetitive phenomenon when the presentation was working (and all the elements of the lesson, V, A, R and K were activated) all the pupils exhibited behaviour expressing different emotions such as pleasure, cooperativeness, and understanding, however a very few pupils (2-4) did not cooperate with regard to a single element of the lesson or several elements (see explanatory table, Table 6.4 below). When the teacher spoke and the presentation was not in operation an exactly opposite phenomenon occurred, only 2-3 pupils cooperated when the teacher turned to ask them questions and they participated in the lesson, while all the other pupils were not cooperating with the teacher (occupied with other matters), In Lessons 3, 5, 6, 11 and 12 while the teacher asked questions only two pupils responded to her questions.

Out of all the Lesson Events Reports for this class, there were 28 events in which pupils were observed when they were asked a question by the teacher (a question which appeared in the presentation), 18 of these pupils were observed answering the question correctly (64% of those asked questions) and for 10 it was observed that they did not know the correct answer (36% of those asked questions).

It is also important to note that external events sometimes distracted the pupils' attention as happened during the screening in the lesson using Presentation 10 when many pupils from another class entered the library in order to arrange books and interfered with the learning of pupils in Class F.

Table 6.4: Table noting the pupils who expressed a lack of interest in particular teaching elements during all experimental lessons with the presentation (Class F)

Pupil's name and Learning Style	Presentation showing Visual element	Presentation showing Auditory element or Teacher giving Auditory explanation	Presentation showing Reading/writing element
MH(VARK)	(–)		
ME(K)	(–)(–)(–)(–)		(–)(–)(–)
LD(VR)	(–)(–)(–)	(–)	
NN(K)	(–)		(–)
MG(K)			(–)
LB(VARK)			(–)
KV(VARK)	(–)(–)	(–)	(–)(–)
OS(VARK)	(–)		(–)(–)
MI(K)	(–)(–)(–)	(–)	(–)(–)
KW(VARK)			(–)(–)
JT(R)			(–)
KU(A)			(–)
KX(VARK)			(–)

Summary of observation of lack of interest in the lesson with a presentation in Class F: Consideration of Table 6.4 above

This table shows seven pupils observed as showing a lack of interest in one of the three teaching elements presented in the lesson (MH, LB, MG, KW, JT, KU and KX), four of them have VARK learning style, one has an R learning style, one has an A and one has a K style.

Six pupils were observed showing lack of interest in more than one element; several times during the lessons: ME, LD, KV, MI, OS and NN. Three of these pupils had a VARK learning style, three pupils had a K style and one had a VR style. All these pupils (except for LD) had a K component in their learning style. It should be noted that three of these pupils were new immigrants but the researcher did not relate to this issue as this was beyond the boundaries of the present research. It can be seen that ten pupils out of thirteen were observed showing lack of interest during the use of the R element, when the presentation was stopped and the pupils were asked to read and write. It may be that this event, by its very appearance, interrupted the sequence of the lesson and disrupted the interest of these specific pupils from their occupation with the writing task. This, according to the teacher, was a bother for them.

In this class, four pupils were diagnosed as having a K learning style and it is interesting to see that all four pupils (MI, NN, ME and MG) are in the group which was observed as showing lack of interest during the appearance of the V, A and R elements in the lesson, in relation to the total number of events that occurred in the lesson, these incidents constituted a negligible number but the phenomenon is still interesting.

6.4 Observation Findings during Lessons with the Presentation: Class E2

The teacher T., who taught Hebrew language studies in Class E2, reported that the integrated class (mainstream and special needs pupils) was academically weak, and many pupils had comprehension difficulties (see Appendix 8.1: Observation Protocol Class E2).

Nevertheless the teacher was impressed by the grammar lessons assisted by the special presentation: *'I'm already enthusiastic, usually they just gaze into space and do not participate, and today pupils who usually do not participate did participate, I'm already excited about the next lesson'* (see Appendix 8.1: Observation Protocol Class E2).

The complete analysis of the data from the observations during the lessons with the presentations in all the classes appears in Appendix 6.1 (Tables 6.15-6.38 and adjoining text with data analysis).

Summary of the observations during the lessons with presentations in Class E2

The teacher T. was observed making only minimal pauses in the screening of the presentation to make oral explanations; she allowed the presentation to run and when she nevertheless did stop the presentation and explain then it was observed that the pupils were mostly occupied with other matters.

During the lesson which used Presentation 8: the teacher was observed distributing work pages and explaining and the pupils in the class were observed being occupied with other matters.

During the lesson which used Presentation 7: during Event 1 the presentation was displaying pictures and the teacher was observed trying to catch the pupils attention, but the pupils were observed not cooperating and continued to watch the pictures in the presentation. It was clearly seen that when the presentation was active, all the pupils, almost without exception, were observed watching, listening, writing and cooperating.

Out of the 58 occasions (collected from all the lessons with presentations observed in this class) on which the teacher was observed turning to a pupil with questions from the presentation, only 14 pupils (constituting 24% of those asked) were observed not knowing the answer. These pupils were diagnosed with the whole range of learning styles, so that the researcher cannot explain this phenomenon in terms of particular learning styles. However it was observed that most of the pupils in this class (76% of those asked) answered the questions from the presentation put to them by the teacher correctly.

The researcher filled in the following table, Table 6.5 with the details regarding the events in which pupils were observed showing a lack of interest.

Table 6.5
Table noting the pupils who expressed a lack of interest in particular teaching elements during all experimental lessons with the presentation (Class E2)

Pupil's name and Learning Style	Presentation showing Visual element	Presentation showing Auditory element or Teacher giving Auditory explanation	Presentation showing Reading/writing element
GF (VARK)			(–)
FC(VARK)			(–) (–)
FD (K)			(–)(–)(–)
JP(A)			(–)
HK(VAK)			(–)
EX (K)			(–)
HN(VAR)	(–)		(–)
GI (VARK)	(–)	(–)	
FZ(VARK)	(–)		

The table shows that out of all the events that were observed during the 11 lessons with the presentation in this class, in only three cases were the pupils observed not watching the presentation during the activation of the Visual element, the pupils were: HN (VAR), GI (VAR) and FZ (VARK).

In only one case out of all the events a pupil was observed as inattentive when the Auditory element was activated in the presentation: GI (VARK).

There were a total of 10 cases out of all the events in which 7 pupils were observed not writing or reading when the Reading/writing element was activated in the presentation and they were asked to write the rules or to read them. In these cases they were observed not complying with the requested

task. These pupils were: GF (VARK), FC (VARK). FD (K), DT (A), HK (VAR), EX (K) and HN (VAR).

It can be seen that most of the pupils observed as absorbed in other matters that did not relate to the lesson, did not participate in the practice of the Reading/writing task. Out of 9 pupils who were observed occupied with other matters, 7 did not participate in the Reading/writing. Three of them have an R component in their learning style.

HN, GI and FZ were observed busy with other matters during the activation of the Visual element in the lesson and they all had a V component in their learning styles. This phenomenon cannot be explained according to the theories of learning styles however it is possible to see that these incidents constituted a negligible proportion of all the events that occurred during the lessons. Nevertheless it is important to consider the fact that when the pupils were asked to read and write while the presentation was active, and it became necessary to stop the presentation for this purpose, and to organise their writing equipment it was observed that this was experienced as an interrupting event for the pupils, breaking their sequence of concentration. In general it can be said that the pupils were observed expressing revelations of happiness in their participation and attention in most of the cases, except for the isolated cases detailed above, when it was observed that the teacher stopped the presentation to orally explain or when the pupils were observed not cooperating when they were asked to read or write.

6.5 Observation Findings during Lessons with the Presentation: Class E1

T. was the Class Teacher for this class, the lessons began at 9:00 a.m. and the lesson before this lesson was a sports lesson. The pupils arrived slightly tired and sweaty, and after the excitement of a sports lesson. In general according to the reports by the teacher of this class, Class E1 had better academic achievements than Class E2. This class was also an integrated class (special needs pupils join the main class lessons).

Analysis of the data from the observations during lessons with the presentation in this class appear in Appendix 6.1

Summary of Observations in Lessons with the Presentation, Class E1

T. is the teacher in this class. Observations of her lessons showed she did not stop the presentation often to provide explanations, but when she did stop to explain, many of the pupils were seen to be busy with other things. In general, the observations showed that when the presentation was active all the pupils were observed watching the presentation, reading, writing and taking part in the lesson, besides single cases, 7 in number, in which all pupils in the classroom were observed doing other things. A review of the Lesson Events Reports shows:

In the lesson held on 22.10.04, event 4, the pupils were observed not knowing the answer to the question: "*what's the difference?*", until EW (VARK) (event 5) was observed providing the correct answer. A look at the presentation itself showed that the questions were about subject matter from the previous year.

In the lesson held on 3.12.04, event 13, some pupils in the class were observed not copying the rules from the board, indicating a writing problem, an R element. Additional review of the Lesson Events Records indicated that some pupils were seen to copy quickly and then wanted to see the presentation itself, while others couldn't copy in time or were not trying to copy quickly because they wanted to watch the presentation.

In the lesson held on 11.3.05 (event 9), a large number of pupils were observed not paying attention. Additional examination of the Lesson Events Records showed that when the presentation showed explanatory flowcharts, the large number of charts bored them. However, this issue was not within the boundaries of the current study.

On the same day, during event 4, the pupils were observed providing incorrect answers. A review of the Lesson Events Records showed this happened after two weeks' absence and they had apparently forgotten the subject matter. On the same day, event 11, the pupils were observed providing incorrect answers. Again, charts were boring. On 18.3.05, the

teacher asked CN (VA) (event 29) a question – the teacher could not explain what she wanted and in the meantime the rest of the pupils were inattentive (30).

On the same day (event 37), the presentation taught expressions, the lesson seemed to be flowing and the pupils were observed enjoying it, but when the teacher asked them to write sentences including the studied expressions, they were observed showing signs of ill-will and objection (event 37). The observed pheonomenon was that when the presentation is stopped and the pupils were asked to write, they did not cooperate. Additionally, attention should be given to the flowchart phenomenon in the presentation. Those charts are probably not suitable for most pupils in the class, but this aspect of the cognitive processing necessary to cope with charts exceeds the boundaries of the present study.

Of the 81 occasions on which the teacher was observed asking pupils questions from the presentation (collected from all lessons observed in this classroom), 68 pupils were observed giving correct answers and only 13 were observed providing incorrect answers, constituting 16% of the pupils approached. They were diagnosed with learning styles of all types and the author cannot therefore explain this case in terms of learning styles. However, it is also correct to say that most pupils in the classroom, 84%, were observed providing correct answers to questions from the presentation.

The author filled out Table 6.6 below to relate to cases of lack of interest:

Table 6.6
Table noting the pupils who expressed a lack of interest in particular teaching elements during all experimental lessons with the presentation (Class E1)

Pupil's name and Learning Style	Presentation showing Visual element	Presentation showing Auditory element or Teacher giving Auditory explanation	Presentation showing Reading/writing element
BJ(VARK)	(–) (–)(–) (–)		15(–)
BI (R)	(–)		(–) (–)
CK(RK)	(–)(–)		(–)
DP(VAK)	(–)		(–)
AD(R)			(–)
DQ(VARK)	(–)	(–)	(–)
AB(ARK)			(–)
EU(VARK)	(–)		
DT(VAK)	(–) (–)		
CN(VA)	(–)		
CO(VARK)	(–)		
EW (VARK)		(–)	

If we disregard the events with BJ, the special education pupil, who according to her teachers, refrained from any writing in the classroom, there were 19 cases of lack of attention observed in 11 lessons with the presentation. In 10 of these cases, 8 pupils were observed not watching during the use of a Visual element in the presentation, of these only BI(R) and CK (RK) do not have the element V, in their learning style. This does not however explain the phenomenon in terms of learning style theory.

In 2 of all cases of lack of interest observed during the 11 lessons using the presentations, two pupils were observed not paying attention while the Auditory element was employed. Both pupils have VARK learning style including an Auditory element, disallowing an explanation of the phenomenon in terms of learning style theory.

In 7 of all cases observed in 11 lessons with the presentation, 6 pupils were observed not reading or writing during the use of the Reading/writing element. They were requested to write down or read out the rules but were observed not performing the requested task. Of them, only DP (VAK) does not have an R element in her learning style. This does not allow an explanation of the phenomenon in terms of learning style theory.

There are several pupils whose lack of participation is prominent, including BI (R), CK (RK), DT (VAK), DP (VAK), DQ (VARK) and BJ (VARK), who were all observed doing other things more than once. BJ, a special needs pupil, was observed not writing when the teacher asked the pupils to copy rules from the board. But on the other hand she was observed participating and giving the correct answers several times. Following or during unusual events, including a particular sports lesson, or classroom photo session, pupils were observed to be restless.

A number of pupils were observed writing parts they were not required to write in order to improve their grasp on the material (so they said). When the teacher asked questions not related to the presentation, several of the pupils were observed not knowing the answer.The author also noticed the phenomenon that when the pupils were asked to write or read and the presentation continuum was interrupted; they found it hard to go back to the presentation.

In summary, the pupils in this class were generally observed to be busy, taking part in the requested activities, enjoying the lesson and giving correct answers, except for a few cases and single pupils, 6 in total, who were observed doing other things. No special characteristics or explanation were found in terms of learning style theory for these pupils' behaviour, However, one girl who was known to have special needs, which might explain her behaviour.

The pupils were observed engaged in other things when the teacher halted the presentation to provide additional explanations or when the material was explained with charts. However, as mentioned above, the reasons for this phenomenon exceed the study's boundaries. When the pupils were asked to

read or write it was observed that they found it difficult to move from writing to watching and listening.

6.6 Stage G: Summary of Analysis of all Observations in Lessons with the Presentations

It was clear that most pupils in the three classrooms were observed participating, paying attention, enjoying the lesson and carrying out the requested tasks when the presentation was operating and presenting the lesson that included all three teaching styles: Visual, Auditory and Reading/ writing. Most pupils reacted positively, except a small number of pupils observed in an average of two events per lesson in which they were engaged in things that did not pertain to the lesson. The opposite occurred in the lessons when the teacher was observed explaining parts of the lesson orally, most pupils were engaged in things that did not pertain to the lesson and the teacher conducted a conversation with two or three pupils.

Summarising all the tables (Tables 6.4-6.6) recording cases of inattention in the three classes into a single table, provided the opportunity to view the list of all pupils observed doing other things, instead of relating to what was displayed in the presentation or what the teacher asked them to write or read from the presentation.

From the collation of all the Lesson Events Reports (Tables 6.7-6.41 in Appendix 6.1) from all the experimental lessons in all three classes, it is seen that 70 events were observed in which the pupils were engaged in other occupations not pertaining to the lesson while the presentation was displayed. This is a negligible number compared to the many events that occurred during the 34 experiemental lessons (see number of events and their type in pie chart for each lesson, Appendix 8.1). Furthermore, only 17 of the pupils in this deviant group were observed on more than one occasion doing other things, a negligible number compared to the total number of pupils in the classes.This group has different learning styles but one can see that a majority, 14 of 17 pupils, have a Kinaesthetic element – K – in their learning style and they constituted 84% of these pupils.

One might perhaps explain their inattentive behaviour during the lesson in which the presentation taught using a combination of Visual, Auditory, and Reading/ writing elements as a result of the fact that most of them have the K element in their learning styles. However:

- 10 of the 17 pupils, approximately 59%, have an Auditory element in their learning style.
- 11 of the 17 pupils, approximately 64%, have a Visual element in their learning style.
- 11 of the 17 pupils, approximately 64%, have a Reading/writing element in their learning style.

It is therefore not possible to understand this phenomenon, according to the pupils' learning style, or any explanation founded on the learning style theories.

The largest number of events in which pupils were observed engaged in other matters, 38, occurred during the use of the Reading/writing element. In these incidents, pupils were asked to either read aloud or write the rules in their notebook. This operation that halted the presentation was observed as a disturbance. It was seen that the pupils found it difficult to move from writing to looking and listening to the presentation and vice-versa.

It is also noticeable that the pupils were observed engaging in other things when the subject matter was explained in charts, but as mentioned, the reason for this phenomenon is outside the study boundaries.

When analysing the observations, additional data must be considered regarding the pupils (see teacher's statements), i.e. the fact that among the pupils in the classes where the experimental lessons were employed there were several new immigrants who spoke their mother-tongue at home and used their mother-tongue with friends during playtime and after school, meaning that the study of the grammar of the 'newly-acquired' Hebrew language was more difficult for these pupils. Naturally, they also had difficulties writing, not to mention reading aloud in the classroom. They therefore experienced challenges unrelated to their learning style or the

Visual, Auditory and Reading/writing teaching elements employed in the lesson.

However, in summary it can be concluded that all the pupils were observed exhibiting joy and satisfaction in the experimental lessons that integrated Visual, Auditory and Reading/writing teaching styles. A prominent turning-point was observed when BJ (VARK), a special education pupil in Class E1, was seen in most observations taking part and paying attention (although she did not write or read aloud from the presentation). This was an unusual event (according to the teacher, see Appendix 9.1). Pupils who were considered academically weak also took an active part in the lesson in contrast to their usual classroom behaviour (according to the teachers, see Appendix 8.1: Protocols of Observations of Lessons with the Presentation) and their participation pleased the teachers and other pupils.

In the observations of the experimental lessons in Classes E1 and E2, most pupils, when asked questions relating to the presentation provided correct replies. 76% of all pupils in Class E2 and 84% of the pupils in Class E3 who were asked gave correct answers, while a small number of pupils did not answer these questions correctly. Year 6 (Class F) pupils exhibited a similar finding but a smaller percentage, 64%, of the pupils in Class F who were asked gave correct answers.

The findings above indicate that the pupils perceived the subject matter with all their senses and reacted positively to all teaching styles. A slight reservation relates to the Reading/ writing tasks: when the pupils were requested to read or write and were detached from the presentation sequence, they found it hard to return to track. The pupils were observed experiencing difficulty or a lack of interest when the teachers' oral explanations were lengthy, when the teacher used expressions that did not belong to the presentation and when flow charts were displayed with the studied subject matter. As noted, the appropriateness of flow charts and the reason for the pupils difficulty in relating to the charts is an issue outside the boundaries of the present study.

CHAPTER 7: DATA COLLECTION AND ANALYSIS FROM THE OBSERVATIONS DURING THE KINAESTHETIC PART OF THE LESSON

7.1 The Data Collection Process in the Kinaesthetic Part of the Lesson

This section details the process of the observations of the Kinaesthetic part of the lesson. The researcher observed the Kinaesthetic work of one group in each lesson. During the year each group was observed twice.

7.1.1 Stage A

The process began with the evaluation of the pupils' learning styles and continued when the researcher wrote down records of her observations during the pupils' work with the Kinaesthetic exercise book.

Since the Kinaesthetic element could not be included in the presentation, which was employed in the experimental lesson, the last quarter of an hour of the research lesson was set aside to allow the pupils to sit in groups and perform Kinaesthetic tasks in their exercise books, which provided exercises to enhance their sense of touch.

Materials used were silver paper, paints, cards, and tools such as engravers, rulers, scissors, masking tape, cardboard and glue. After the pupils worked on the Kinaesthetic tasks in class, they were supposed to gradually start to create things by themselves in class and in their homework in order to revise the new and difficult information presented to them in class (Dunn and Dunn, 2005).

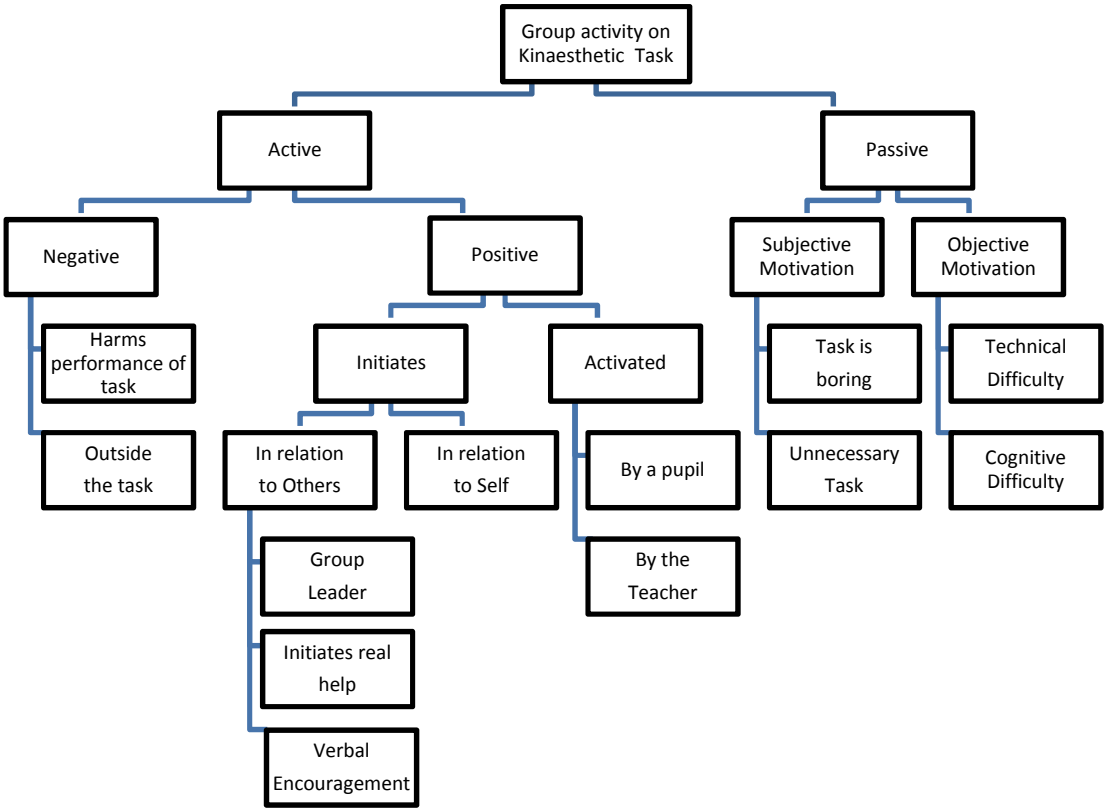
Since there were differences between the lesson that included the presentation and the Kinaesthetic work in the exercise books (see explanations in Section 6.1.2) the researcher saw it fit to collate the data from the two parts of the lesson in different ways; the collation of the Kinaesthetic observation was conducted as follows:

In the observations of the lesson with the presentation, the researcher wanted to see how the pupils acted and reacted in the experimental lessons, which included a combination of different teaching styles (V, A or R), in accordance with their personal style as diagnosed in the VARK questionnaire. During the Kinaesthetic observation, the researcher concentrated solely on the Kinaesthetic elements and how the pupils with different learning styles reacted to this teaching style on pupils.

- Did they concentrate on the task or were they distracted by matters not included in the task?
- Did they work energetically, willingly and enthusiastically, or did they try to evade the task?
- Did they express their enjoyment of the task either verbally or non-verbally, or on the contrary, were there expressions of discontent, dissatisfaction and lack of enthusiasm?
- Did they succeed in performing the tasks or not, did they successfully build the model which they were asked to build?

All these questions were considered in relation to the pupils' learning styles and recorded in the written records of the Kinaesthetic part of the lesson (see Appendix 7.1: Protocols of Observations of Kinaesthetic Work). In order to answer these questions, the researcher designed a mapping table according to the following mapping tree, shown in Figure 7.1 below:

Figure 7.1: Criteria mapped in the Kinaesthetic part of the Lesson



An example of the written records of the Kinaesthetic part of the lesson is given here (for complete records of the lessons see Appendix 7.1: Protocols of Observations of Kinaesthetic Work).

Example of protocol of observation of kinaesthetic work

Group A

Observed on 22.10.2004; Observed again on 24.12.2004

Name of pupil	Learning style	Sex
AA	K	Girl
AC	VARK	Girl
DQ	R	Girl
EW	R	Girl

22.10.2004

Kinaesthetic Task: The pupils cut cards out of a page in the exercise book; on each card a word was written. The task was to create meaningful sentences by arranging the cards in a logical order. Each pupil took several cards. They could perform the task individually or as a collaborative task between pupils, by exchanging and combining cards (see Figure B below). At the second stage the activity involved different actions concerning each sentence.

Figure B

An example of correct order

Cards spread over table

The Observation

AA leaves her place, passing between the pupils and asking for scissors. AC asks her: *'Do you want to work together with me?'* AA shrugs her shoulders: *'No. just give me a few minutes with your scissors*'. AC gets up, turning her head to the side: *'I'm busy let me work quietly'*. AC cuts out the cards. She places them on the table. She moves the cards from place to place. She doesn't manage to construct a sequence of sentences. She rests her head on the table, looks at EW and says: *'I can't do it! Everything's upside down! What a mess!'* EW does not answer. AA plays with her pencil. Suddenly she gets up and takes AC's cards, and puts them in the correct order. AC smiles: 'Great, we'll work together'. She gives AA her scissors. Until the end of the lesson they both work quietly. They do not talk to one another, but they arrange the cards together.

7.1.2 Stage B

The researcher now studied her written records of the observations according to the classes and groups and she entered the details for each class described in the records into the mapping table. An example of this table appears below as Table 7.1.

Table 7.1: The Mapping Table for the Observation of the Kinaesthetic Part of the Lesson

Group And Pupil's Name	Pupil hinders	Acts outside the Task Framework	Group leader	Gives Real help	Verbally Encourages	Helped by teacher	Helped by pupil	Works alone	Boring task	Unnecess-ary Task	Technical Difficulty	Cognitive Difficulty

The following are the summaries of the analyses of data from the observations during the Kinaesthetic part of the experimental lessons, the complete analyses of these data for all participating classes appear in Appendix 7.1: Protocols of Observations of Kinaesthetic Work.

Observations Findings for Class E1

In total there were 23 pupils in this class. They sat in six permanent groups. Each week a different group was observed. The seating arrangement of the different groups in the classroom appears in Appendix 7.1.

Summary of Analysis of all Observations of the Kinaesthetic Work in Class E1

This class numbers 23 pupils. During the experimental lessons, the pupils were seated around the desks, a total of six desks. At each observation, the researcher observed a single group of pupils seated around a single desk. Each group was observed twice. Based upon the researcher's observations in this class, during the Kinaesthetic part of the lesson, it seemed as though most pupils who were diagnosed with a Kinaesthetic element in their learning style, liked the Kinaesthetic type of activity, and drew pleasure from it. Sometimes, those who did not understand the cognitive aspects of the assignment were assisted by other pupils in the group, to grasp what was needed, and then began working. Some pupils, whose learning styles lacked the K-element, demonstrated distress and a lack of motivation to perform the Kinaesthetic assignments. They were assisted by other pupils in the group, who offered practical assistance. The mapping tables indicated that all pupils worked and usually completed the assignments.

The mapping of all the events during the Kinaesthetic part of the lesson indicates that of all the 23 pupils, there were only three pupils who disrupted the Kinaesthetic activity (AE, whose learning style was classified as VRK, BF, whose learning style was classified as VAR, and BI-classified as R). Only one of these pupils had a K-element in his learning style. Three pupils out of the class of 23 engaged in activities other than the assigned task (BJ – VARK; BI – R; CN – VA). It is seen clearly, that the columns relating to assistance, both for practical assistance and verbal assistance, are completely filled. Although this issue is not included in the study's scope, it is still a noteworthy item of data.

Two pupils were observed as finding the Kinaesthetic activity boring (EW, VARK; BF, VAR). None of the pupils were observed as finding the Kinaesthetic activity unnecessary. A noteworthy item of data within the table is the datum pertaining to the criterion 'helped by teacher', which related to three pupils who were observed requiring the teacher's assistance (DT, VAK; EV, VRK; DS, K). This item of data suggests that most pupils did not require the teacher's assistance, and that the first part of the lesson, in which the presentation was included, assisted most pupils in the class to understand their assignments, so that they could assist their classmates who faced difficulties in the Kinaesthetic work. They all worked and completed their assignments, as indicated by the fact that all the pupils in the class appear in the criterion column *'Works Independently'*. Meaning that there was no pupil who was found not to participate and act within the framework of the assignments. It may be concluded that although difficulties were observed at the beginning of the Kinaesthetic activity, the pupils managed to overcome them and work, implying that the pupils responded positively to the Kinaesthetic activity.

Summary of Analysis of all Observations of the Kinaesthetic Work in Class E2

This class, too, includes few pupils, therefore each group was observed twice. The researcher observed the Kinaesthetic activity, noticing that the pupils' learning style was related to their action within the Kinaesthetic assignments. In this class, the groups were divided so that each group included pupils who had a K-element in their learning style, as well as pupils who lacked that element in their learning style. In this class like the previous class the researcher observed that the pupils all accomplished the Kinaesthetic assignment at the end of the lesson, and expressed enthusiasm about their outcomes.

As in Class E1, in this class, too, there were mutual assistance processes. In Group A, a pupil lacking a K-element in his learning style received practical assistance and successfully accomplished the assignment. In Group B, a pupil with a K-learning style was assisted by other pupils for the cognitive aspect of the task, resulting in his successful accomplishment of the assignment. In Group C, all the pupils had the K-element in their learning style, and they worked well. In Group D the pupils had miscellaneous learning styles, and they

encouraged one another. In Group E, there were no comprehension problems, yet there were problems relating to leadership, while in Group F, one pupil worked slowly and received encouragement and reinforcements.

Again, it seems that it was the pupils who lacked the Kinaesthetic element in their learning style who demonstrated difficulties in performing the assignment, while pupils whose learning style contained the K-element successfully accomplished the Kinaesthetic assignment, but sometimes they needed cognitive assistance from their fellow group members. The Kinaesthetic part was seen as a revision of the subject matter which the pupils had learnt in the lesson with the presentation. Table 7.2 (in Appendix 7.2: Analysis of Data from Observations of the Kinaesthetic Part of the Experimental Lessons) that maps all the events in this class during the Kinaesthetic part of the experimental lessons, indicates that out of 25 pupils in the class, five pupils disrupted the Kinaesthetic activity (GI, whose learning style was classified as VARK; FD, whose learning style was classified as K; GH, VK; GF, VARK; GG, VARK), despite the fact that all of them had a K element in their learning styles. Four pupils engaged in activities which were unrelated to the assignment (FD, K; GH, VK; GF, VARK; and PA R). Three of them were also part of the previous group of pupils, who were observed as disruptive. The columns relating to both practical assistance and verbal assistance are full. Although this matter is not included in the study's scope, it is a noteworthy item of data. Only one pupil did not show any interest in the Kinaesthetic activity (GI, VARK); while two other pupils repeatedly complained that they found the Kinaesthetic activity boring (GH, VK; PA, R).

A noteworthy item of data in the table relates to the criterion 'Helped by teacher', no pupil is marked in this column, indicating that the pupils did not need the teacher's assistance, and that the first part of the lesson, which included the presentation helped most of the pupils in the class to understand the assignments, so that they could even assist friends who found the work more difficult. They worked and completed their assignments, as indicated in the column labelled 'Works Independently', marked for all the pupils in the class. This means that none of the pupils was observed as not participating and not active and they all performed the assignments.

It may be concluded that, although the researcher observed difficulties at the beginning of the Kinaesthetic activity, the pupils were able to overcome those difficulties and work well, proving that the pupils reacted positively to the Kinaesthetic activity.

Summary of Analysis of all Observations of the Kinaesthetic Work in Class F

This group numbered 30 pupils. It was not possible to observe each group twice. Therefore, the pupils were divided into nine groups, each was observed only once. The group observations suggest that the pupils found the activity interesting. The mapping table of the class, Table 7.4 (in Appendix 7.2: Analysis of Data from Observations of the Kinaesthetic Part of the Experimental Lessons) shows that the column labelled as 'Works independently' is marked for all pupils in the class. The columns relating to the criterion 'assistance' are also filled in for all the pupils, especially the column for the criterion 'Gives Real Assistance' which relates to the pupils who assist each other. It is apparent that the Kinaesthetic activity yields additional valuable outcomes, such as assistance, support and encouragement, also implying concern and commitment to the task, though these values are not included in this study's scope. It is also noticeable that only one pupil, KU, who had an A learning style, engaged in activity which was unrelated to the Kinaesthetic activity. OT, who had a VARK-learning style found these activities unnecessary. She is the only one marked in the column for this criterion.

Although at times a cognitive or technical difficulty arose, the pupils managed to overcome these difficulties, accomplishing their assignments. In this class, it is evident that pupils who lack the Kinaesthetic element in their learning style (in Group D there are two pupils with a typical R learning style), are nevertheless contented and work well.

7.1.3 Stage C

In this stage, the researcher assembled all the sorting tables, from all classes, observing them yet again in order to summarise the findings and to analyse them, together with the group summaries. The following is the comprehensive summary for all three classes:

Summary of the analysis of the observations of the Kinaesthetic work in all three classes

The class observations, during the Kinaesthetic part of the lesson, provided the researcher with the evidence that a combination of several learning styles in the preliminary part of the lesson did not resolve the difficulty experienced by some of the pupils whose learning style lacks the Kinaesthetic element, to perform Kinaesthetic activities. Seemingly, some of the pupils who lack that Kinaesthetic element in their learning style exhibited a difficulty with the Kinaesthetic activity. However, even some pupils whose learning style contained that element, demonstrated distress which was manifested by lack of ability to begin the Kinaesthetic activity. They did not always understand the cognitive part of the assignment, since the Kinaesthetic activities required both cognitive skills, and Kinaesthetic skills.

A situation developed in which, the group dynamics and the processes occurring within that framework generated creative solutions to the problem which arose. Although this point is not included in the study's scope, this phenomenon seems worthy of consideration. The pupils in the group benefited from the skills of others. Several pupils who did not demonstrate Kinaesthetic skills, but demonstrated cognitive skills and understood the assignment, benefited from other pupils in the group, who assisted them with the practical Kinaesthetic part. In contrast, pupils who lacked cognitive skills, but had Kinaesthetic skills, wanted to begin the work and did not know how, and they were assisted by pupils who had cognitive skills and thus were able to work and yield actual outcomes, allowing them to feel capable. While this finding is not included in the study's scope, as the researcher does not engage in the issue of group learning processes, this phenomenon, which was intensely sensed, cannot be overlooked.

The observations indicated that knowledge had been acquired from the Visual, Auditory, and Reading/writing parts of the lesson, which included the presentation, as there were very few approaches to the teacher for explanations. Aside from EV, who approached the teacher, all the other pupils

managed to overcome their difficulties within their groups. It is evident that as soon as the weaker pupils received some assistance from their fellow group members, they understood and performed the task. They also felt reinforced by their contribution and input to the assignment, which in turn improved their feelings of capability and confidence, thus enhancing their motivation

7.2 Stage H: Summary of Analyses of Kinaesthetic Observations and Analyses of Observations in Lessons with Presentation for all Experimental Lessons

The experimental lesson was comprised of two parts, the lesson with presentation, and at the end of the lesson, independent Kinaesthetic work in groups. The part with the presentation included:

- Learning by observing the presentation that included a combination of Visual, Auditory and Reading/writing teaching elements.

Oral explanations provided by the teacher integrated with the presentation display. The purpose of these explanations was to explain the subject matter and provide an additional Auditory teaching element, the 'teacher's oral explanations' (a), in addition to the sounds within the presentation. The part of the lesson involving group work on the exercise book included Kinaesthetic work.

It is definitely clear from the observations that most pupils (from those diagnosed with single element learning styles to those who had learning styles comprised of all several elements), in the three classes: E1, E2 and F, were observed participating, paying attention and cooperating in the experimental lessons, in both the part in which they studied with the presentation and the part in which they performed Kinaesthetic work on the booklet, with the following exceptions:

Observation of the three classes clearly showed that when the teacher was explaining the subject matter orally, most pupils in all three classrooms lost touch with the teacher's explanation and were observed doing things unrelated

to the lesson, while the teacher continued her explanations or questions with a small number of pupils, 2-3 of them.

Contrastingly, when the presentation was active and the pupils were asked questions relating to the presentation and received responses from the presentation, an extremely small number, 1-2 pupils in every lesson, were observed not cooperating in more than one or two events, when these events referred to particular elements (Visual, Auditory or Reading/writing). Totalling the pupils who did not cooperate in this manner from all classes, it transpires that 17 pupils were observed failing to cooperate (according to criteria in the mapping tree: Figure 6.1, p.193). This is a minute number compared to the number of lessons, 34, the number of events per lesson (see details of number of events per presentation throughout this chapter and presentation pie charts) and the number of pupils who took part in the study lessons, 72. Besides the fact that 84% of these pupils exhibit a Kinaesthetic element in their learning style, learning style theory does not provide an explanation for this data.

Additionally, it is concluded that the element that disturbed this group more than others was the Reading/writing element. This disturbance, too, cannot be explained by learning style theory and perhaps the fact that most pupils were immigrants and the difficulties of transition from a state of listening and viewing to a state of reading and writing when the presentation was paused may have caused these disturbances in learning.

Especially noticeable is the change that occurred for the special needs pupil, BJ (VARK), integrated in Class E1, who was observed taking an active part in lessons, something that, according to her Class Teacher's report (see Appendix 9.1), did not happen in other lessons. Other academically weak pupils were also observed taking part and giving correct answers from the presentation, pleasing the other pupils and the teacher.

During the part of the lesson that included group work in the Kinaesthetic exercise book, a few pupils were observed running into difficulties, a single pupil in each of the observed groups. Pupils whose learning style lacked the Kinaesthetic element were usually observed running into difficulties when work began, but were motivated and assisted in the performance of the task by the

other group members. This finding deviates from the boundaries of the current study since the study does not deal with group dynamics. Some of the pupils whose learning style did contain the Kinaesthetic element were observed having difficulties at the beginning of the work, since an initial special cognitive aspect was involved in the Kinaesthetic work. These pupils were also assisted and motivated by the remaining group members, but consideration of data concerning cognitive difficulties arising in group work exceeds the study boundaries.

At the end of each observation of the Kinaesthetic work, all pupils were observed completing the task. With the exception of a single pupil, all the others did not need the teacher's assistance, showing that they managed to comprehend the tasks and carry them out. Although it is not possible to determine the exact reason for this, perhaps it can be assumed that this was because they had absorbed and mastered the subject matter in the first part of the lesson that included a combination of Visual, Auditory and Reading/writing teaching styles.

CHAPTER 8: DISCUSSION

8.1 Introduction

The research investigated whether lessons that combine different teaching styles (Visual, Auditory, Reading/writing and Kinaesthetic) hinder or assist the learning of primary school pupils with different personal learning styles, according to the pupils' responses.

Both quantitative (questionnaires) and qualitative (interviews and observations) research tools were employed to examine these questions and the data produced by these tools enhanced and complemented each other and together provided a rich in-depth picture of the studied phenomena.

The VARK questionnaires which the pupils completed before participating in the experimental lessons indicated that pupils in the three studied classes: Class E1, Class E2 and Class F in the studied Israeli primary school G had many varied leaning styles (see Table 4.2, p. 133). The main concepts that were found relevant to the studied issue and adopted for the research's conceptual framework were derived from different fields of knowledge and related to learning/teaching styles, cognition, multimedia, and motivation.

This chapter discusses the findings presented in chapters 4, 5 and 6 and their correlation with previous theory in this field and previous research findings. The discussion is set out below according to the order of the Research Questions.

8.2 Summary of the Research Findings

The following is a summary of the research findings according to the order of the Research Questions that they answered.

Table 8.1 Summary of Findings by Research Question

Research Question	Findings
Research Question 1*:* *Does a combination of teaching styles hinder the learning of pupils with a particular learning style?*	It seems clear from the findings that the combination of the V, A, R and K elements in the experimental lessons did not hinder the pupils' learning
Research Question 1 A. *To what extent do pupils with different learning styles exposed to teaching composed of additional teaching styles, differing from their preferred style, report problems with studying?*	No differences were found in reports of hindrance to learning between pupils with different learning styles exposed to teaching that included strategies based on teaching styles other than their own.
Research Question 1B *Which element of the integrated teaching styles assists or hinders pupils with particular learning styles?*	Analysis of the questionnaires shows that the **Kinaesthetic (K)** element caused somewhat greater hindrance than the other elements(Visual, Auditory, Reading and Writing), with no difference between the groups. Few differences were found in the extent of the items in the questionnaire reported to cause disturbance. The teachers' **Oral Explanations (a)** were found to hinder pupils to a marginal extent when the pupils' learning style did not include the **Auditory (A)** element. The need to read texts from the presentation was reported as a marginal hindrance by pupils whose learning style did not include the **Reading /writing (R)** element.
Research Question 1C *Do pupils with a learning style that incorporates more than a single element experience more hindrance to their learning than pupils with a single learning element style when exposed to a combination of different teaching*	No significant differences were found in reports of hindrance between pupils with a single learning styleelement, and pupils whose composite learning style contained more than one element.

Research Question	Findings
styles?	
Research Question 2 *Does a combination of teaching styles assist or hinder pupils with a particular personal learning style, according to their reports?*	All pupils were assisted by all the teaching elements in the experimental lessons, irrespective of their learning styles.
Research Question 2A *Do pupils with different learning styles report assistance or hindrance to their learning processes when exposed to a combination of different teaching styles?*	The group of pupils with the R learning style (Reading/writing) and the group of pupils with the VARK learning style reported that teachers' **Oral Explanations (a)** slightly hindered their learning but supported their feeling of capability. Pupils with the **Kinaesthetic (K)** learning style found teachers' oral explanations supported their feeling of capability.
Research Question 2B *Which element of the combined teaching styles is reported as assisting pupils with a particular learning style?*	The most significant assistance within the research lessons was the **Visual element (V)** that helped pupils concentrate and pay attention and contributed to their sense of capability. The **Auditory (A) and Reading/writing (R)** elements were found to assist some pupils in concentrating and paying attention while others could comprehend the subject matter better through these elements, which also reinforced all the pupils' sense of capability. The **Kinaesthetic teaching element (K)** helped pupils master and remember material, increased their sense of capability and their motivation to study. All the pupils' felt that the teachers' **Oral Explanations (a)** contributed to their sense of capability.
Research Question 2C *Do pupils with a combination of different learning styles that contains more than a single element report more assistance for their learning than pupils with a single element learning style?*	Pupils with whose learning styles were composed of several elements were assisted by the research lesson to the same extent as pupils with a single element learning style.

Research Question	Findings
Research Question 3 *How did pupils with different diagnosed learning styles react to lessons taught with a combination of teaching styles?*	A marginal number of pupils did not cooperate with the **Reading/writing (R)** task. Most pupils were dissatisfied with the teachers' **Oral Explanations (a)**. Most pupils took an active, attentive part in the experimental lessons while the presentation was being shown, and answered questions correctly. Most pupils in the classroom did not cooperate in the lesson when the presentation displayed flowcharts. Most pupils did not react happily to the **Kinaesthetic (K)** work although they all completed it successfully.

Table 8.2 below shows the findings gathered from all the research tools indicating whether a particular teaching style (see row headings on the right: V, A, R, K or a – the teacher's oral explanations) employed in the experimental lessons assisted (+) or hindered (-) the learning of pupils with different learning styles as diagnosed by the VARK questionnaire (see column headings). The data are divided in the table according to the research tools from which they were derived (see row headings on the left).

The data shown in this summarising table form the basis for the discussion, especially with regard to Research Question 2b.

Table 8.2: Hindrance or Assistance reported for each Teaching Style Element according to Pupils' Learning Styles by Research Question and Research Tool

Pupil's Learning style / Research tools	VARK	VAR	VAK	ARK	VRK	VR	VK	VA	RK	AR	AK	K	R	A	V	Teaching Style element
Questionnaire Findings for Question 1A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	**V**
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	**A**
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	**R**
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	**K**
Questionnaire Findings for Question 1B					-	-	-		-			-	-		-	**a Marginal Effect**
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**K most hindrance**
Findings from Interviews Stage C	+		+											Movement hindered		**V**
	+		+								Not needed When already understood			+		**A**
	+		-R								W -R+					**R/W**
	+		+											+		**K**

Pupil's Learning style / Research tools	VARK	VAR	VAK	ARK	VRK	VR	VK	VA	RK	AR	AK	K	R	A	V	Teaching Style element
Findings from Stage F Interviews	+++ To concentrate and listen											+++ To concentrate and listen	+++ To concentrate and listen	+++ To concentrate and listen		**V**
	-												-			**a**
	+ Understand Subject matter											+ To concentrate and listen	+ Understand Subject matter	+ To concentrate and listen		**A**
	+ Understand Subject matter											+ To concentrate and listen Hindered when they had already understood		+ To concentrate and listen		**R/W**
	+ Master and Remember Subject Matter	Sense of Capability	Sense of Capability				הרגשת מסוגלות					+ To concentrate and listen		-K		**K**

Pupil's Learning style / Research tools	VARK	VAR	VAK	ARK	VRK	VR	VK	VA	RK	AR	AK	K	R	A	V	Teaching Style element
Findings form Stage G Interviews Concepts of Motivation	Sense of Capability											Sense of Capability	Sense of Capability			**V**
	Sense of Capability	Sense of Capability	Sense of Capability									++ Sense of Capability		Sense of Capability		**a**
	Sense of Capability	Sense of Capability	Sense of Capability									Sense of Capability				**A**
	Sense of Capability											Sense of Capability	Sense of Capability			**R/W**
	Sense of Capability											Sense of Capability				**K**
Findings from Observations	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	**V**
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**a**
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	**A**
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	**R**
	-	-	-	-	-	-	-	-		-	-	-	-	-	-	**K**

8.3 Findings relating to Research Question 1

The first research question was:

> Does a combination of teaching styles hinder the learning of pupils with a particular learning style?

It included three sub-sections as detailed in the sub-sections below.

It seems clear from the findings that the experimental lessons which employed a combination of the V, A, R and K elements did not hinder the pupils' learning apart from a marginal hindrance caused by the R and K elements, and the oral explanations of the teacher (a) and this was only relevant for pupils whose learning style did not include the impeding element.

Thus too no significant differences were found regarding hindrance to learning between pupils with a composite learning style (including more than one element) and pupils whose learning style was composed of a single element.

To some extent these findings comply with previous learning style theories and research findings and yet they also partially contradict previous knowledge. The next section will explain these correlations.

8.3.1 The findings relating to Question 1A

Analysis of the pupils' responses to the questionnaires indicated the following findings with regard to question 1A: *To what extent do pupils with different learning styles exposed to teaching composed of additional teaching styles, differing from their preferred style, report problems with studying?*

No difference was found in the hindrance reported by pupils with a particular learning style exposed to teaching that included strategies based on other teaching styles, i.e. lessons that included multiple teaching styles did not hinder the pupils.

This finding provides a response to previous research conclusions that recognised the need to investigate the effects of variation in teaching styles (McCarthy, 1980, Rose 2008). Rose and Meyer (2006) also suggested using various technological means could be employed in order to advance the learning of all pupils.

The fact that it was shown that the combination of multiple teaching styles indeed did not hinder the pupils' learning, seems to confirm Felder's determination (2002) that everyone has some combination of learning styles with one more dominant than the others, and no type is salient. In fact, the combination of teaching styles in the lessons actually enhanced and increased leaning among all pupils (Richardson, 1984).

The finding that the experimental lessons did not hinder the pupils may also be explained by the fact that the preferred learning styles of each pupil were represented in the lessons i.e. the lesson's teaching style was compatible with their own learning style. In other words when the pupil's preferred learning style was included in the lesson, other teaching styles did not hinder the pupil's learning (Barbe et, al.,1979; Dunn, 1990; Miller 2001; Felder 2002, Wehrwein, 2007; Oshrat & Vidislavski, 2007; Howles & Jeong, 2009; Fountain & Alfred, 2009, Carrier, 2009; Naimie, et al., 2010).

Findings from the interviews in this study also showed that a combination of teaching styles did not in general hinder pupils and even assisted learning. It even helped them to acquire a sense of capability to learn, and assisted learning abilities: their ability to concentrate and listen and to understand the subject matter (see Findings from Interviews, Table 8.2 above).

8.3.2 The findings relating to Question 1B

Analysis of the pupils' questionnaires shows the following findings with regard to question 1B: *Which element of the integrated teaching styles assists or hinders pupils with particular learning styles?*

With regard to the Kinaesthetic element: Analysis of the questionnaires shows that the Kinaesthetic element only caused slightly more hindrance than the other elements of the lesson (Visual, Auditory and Reading/Writing), without

any differences between the different groups This is a clear example of how quantitative analysis can provide an answer that does not give sufficient expression to intrinsic human factors while in-depth observation by the author during all the experimental lessons provides a much deeper picture that contributes and complements the quantitative finding since this finding from the questionnaires can be explained better by the observations.

The author noticed while observing the Kinaesthetic work carried out in groups of 3-4 pupils that the Kinaesthetic teaching style did not really hinder the pupils learning process but rather difficulties were revealed concerning the use of the exercise book. The exercise book included explanations that needed to be comprehended to enable the pupils to complete the Kinaesthetic work i.e. cognitive understanding was necessary before beginning the Kinaesthetic work. Although it was clear that the pupils wanted to participate and to successfully complete the Kinaesthetic work, some of them were delayed from doing so since they were observed displaying cognitive problems (Alloway, 2010), requiring assistance from other group members, but this issue goes beyond the boundaries of this study. Observation showed Kinaesthetic work was unnecessary for most pupils whose learning style did not contain the Kinaesthetic element but who had perhaps already understood the subject matter from the first part of the lesson, but they were assisted by other group members in completing the Kinaesthetic work. When ultimately all the pupils in the group overcame their initial challenges, they were all observed working and were satisfied with the successful result. Group work is outside the boundaries of this study, but on the basis of her observations in this study, the author believes the connection between learning styles and group work would help to understand both these issues.

The findings from the interviews and the questionnaire that Kinaesthetic work only caused slight hindrance and that all the pupils were able to eventually complete the work successfully are supported by the comments of Boella (2010), who relating to younger age elementary school pupils Boella (2010) writes: *'contrary to current opinions, pupils do not always study at their best using their preferred style. It seems Kinaesthetic learning is the most effective for all pupils.'*

Felder (2002, p. 677) also attributes importance to the Kinaesthetic element, claiming that: *'pupils retain 10% of what they read, 26% of what they hear, 30% of what they see, 50% of what they see and hear, 70% of what they say and 90% of what they say and do.'*

The pupils' responses in the interviews also seem to correlate with Boella's remarks (2010) concerning the importance of Kinaesthetic work particularly since Kinaesthetic work seems to have contributed to increasing their motivation (Ryan and Deci 2000a).

Kinaesthetic work was special since it necessitated the application and manipulation of the subject matter that the pupils had understood from the lesson with the presentation. It seems from the observations that when the pupils integrated this understanding in their creative work and successfully completed the Kinaesthetic work this appeared to increase their confidence concerning their mastery of the subject matter. This confidence is an expression of their sense of capability and may perhaps have been the reason for expressions showing an increase in motivation to study in these lessons. This was seen during the observations when they were observed exhibiting signs of happiness on entering the class and were even sorry when an experimental lesson couldn't take place, demanding the teacher refrain from teaching grammar in the usual format (see teacher's words, Appendix 8.1) and additional expression of the pupils' motivation (Ryan and Deci 2000a).

With regard to the Auditory element: Few differences were found in the extent to which the different items (elements) investigated in the questionnaire were reported as causes of hindrance. To a marginal extent, the teacher's verbal explanations hindered pupils whose learning style did not include the Auditory element. Observation results also showed significantly that when the teacher gave exaggeratedly long explanations and questions, most of the pupils, not only those who lacked the Auditory element in their learning styles, were observed doing things unrelated to the course of the lesson while the teacher continued teaching two or three pupils.

This finding may stem from other factors, unrelated to learning styles, and may perhaps be partially explained by the teacher's rich language compared to the simpler language used by the pupils who came from underprivileged background or were new immigrants (Feitelson, 1965); or perhaps because of the lack of compatibility between the terms the teacher used to explain the subject matter and the terms used to explain the same subject in the presentation or perhaps it was the teacher's monotonous voice or the length of time the teacher allotted to her vocal explanations, compared to the lesson with the presentation that was constructed of swiftly changing styles and combinations of styles (see author's observations in the field). Support for this explanation is given by Alloway (2010) who relates to teachers' talking tempo as influencing comprehension of their explanations, stressing the importance of adapting the tempo to the pupils. But this issue too is beyond the limits of the current study.

Additionally the very fact that the presentation was stopped in the middle seemed to annoy the pupils and perhaps disturbed the flow of the lesson for them. On the other hand, in the interviews, pupils reported that they thought that the teachers' explanations were 'important' and helped them to feel a sense of capability, particularly pupils with the K element in their learning style. The question is, were these thoughts the result of the habits they had acquired over the years due to their contacts with a major, significant figure that delivers their learning, or do pupils perhaps really do need a central figure in their studies. This is beyond the boundaries of the study yet this feeling of relatedness to the teacher seems to be considered important by the pupils and supported their sense of ability to learn. Future study could investigate the connection between learning styles with the pupils' sense of relatedness and their sense of ability.

Analysis of the pupil's responses to the questionnaires also revealed an additional finding:

With regard to the Reading element Having to read texts from the presentation was reported as a marginal hindrance for pupils whose learning styles did not include the Reading/writing element.

Both observations and interviews showed that a small number of pupils were hindered by the need to write and even more by the need to read the rules from the presentation. There seemed to be some difficulty in looking at the presentation and copying rules into their notebooks, while difficulty was also caused by the need for transition from watching the presentation to other activity such as reading out loud or writing. This observation is supported by Yariv (2010) who indicates that it is difficult for pupils to move from one type of activity to another.

The author does not believe that the difficulty relating to reading text out loud can be explained in terms of learning styles, but perhaps in psychological terms, as a result of a lack of confidence, fear of failure and social rejection. These explanations received support from the teachers (see teachers' words, Appendix 8.1). The studied population included some underprivileged pupils, new immigrants (as described in section 3.9.1). When faced with a reading assignment in front of the entire class they exhibited and reported emotional difficulties and sometimes a block. For example, pupil BJ (an integrated pupil with special needs) who never wrote or read in regular lessons (according to the teacher, see Appendix 9.1) a difficulty which was also expressed in the experimental lessons.

8.3.3 The findings relating to Question 1C

Analysis of the pupil's responses to the questionnaires shows the following findings: with regard to question 1C: *Do pupils with a learning style that incorporates more than a single element experience more hindrance to their learning than pupils with a single learning element style when exposed to a combination of different teaching styles?*

No significant difference was found in levels of hindrance due to the use of a particular learning style (V,A, R or K) between pupils with a composite learning

style e.g. VARK or VAR style and pupils with a single element learning style e.g. V or R. This finding contradicts the assumptions of several theories.

It has been claimed that pupils learn better if the subject matter is presented in a manner compatible with their own particular learning style (Dunn, 1990; Barbe et, al., 1979; Miller, 2001; Felder 2002, Wehrwein, 2007; Naimie, et. al., 2010) This claim may give rise to the assumption that pupils with several elements in their learning style would suffer less from a lesson that includes multiple teaching styles than would someone with only a single component.

Analysis of interviews and observations also support the questionnaire findings (see summary table of all questionnaire and interviews and observations findings, Table 8.2, p. 234). Table 8.2 shows that findings for pupils diagnosed as having a single element learning style exactly mirror the findings for pupils with multi-element learning styles. This finding shows that neither the pupils with a single element learning style not those with a composite learning style were hindered by the lessons that employed a combination of teaching styles including elements that did not appear in the pupils' learning styles. In other words it can perhaps be concluded that the pupil's learning style is not the most significant matter when the pupils are taught with a lesson that combines different teaching elements (V, A, R and K) and that other factors such as the variety of teaching styles offered may be more influential (Rose, 2008).

8.4 Findings relating to Research Question 2

The second research question was:

> Does a combination of teaching styles assist or hinder pupils with particular personal learning styles, according to their reports?

The second question of the study had three sub-sections as detailed in the sub-sections below.

The term 'assist' indicates that the combination of teaching styles was experienced as something positive by the pupils, according to their reports. Alternatively the term 'hinder' indicates that the combination of teaching styles was experienced as something negative by the pupils.

This question was examined in view of data from the interviews the researcher conducted with the pupils immediately before or after the experimental lessons. The interviews were conducted with each pupil separately and by the end of the school year the researcher had interviewed all Class E2 pupils (see Appendix 5.1: Annotated Transcripts of Interviews).

Analysis of the interviews produced several insights regarding the assistance the pupils received from the lessons that combined different teaching styles. These insights were discovered through the eight stages of interview analysis (see Section 5.4: Summary of Data from Interviews). Each stage contributed to comprehension of the studied phenomenon from a different angle.

8.4.1 The findings relating to Question 2A

Analysis of the pupils' interviews presents the following findings with regard to Question 2A: *Do pupils with different learning styles report assistance or hindrance to their learning processes when exposed to a combination of different teaching styles?*

The interviews show that in the experimental lessons that employed different teaching styles, all pupils felt that they were assisted by all the lesson's elements, irrespective of their own learning style. Rose (2008) suggested that pupils should be provided with different ways of acquiring information and

knowledge using a large number of representation means. Dede (2009) adds the insight that most pupils at this age tend to be disconnected from learning and that technology enables educators to regain the pupils' attention. With the help of technology the present research aimed to integrate four different learning styles within the experimental lessons and it seems from the evidence in the interviews that this combination of styles within a multimedia presentation and with the help of a Kinaesthetic exercise book drew and held the pupils' attention.

When the pupils were examined according to their learning styles it was seen that two groups of pupils, the R (Reading/writing) and VARK groups, indicated that the teachers' oral explanations slightly hindered them, although they reported that these explanations supported their sense of capability. Marginally in responses to the questionnaires it was particularly pupils with the K (Kinaesthetic) learning style who felt that they were assisted by the teacher's explanations, however this was not seen in the observations. The teacher began to explain and teach and several minutes later most of the pupils in the classroom were busy with other things. But when the pupils were specifically asked to report their impressions regarding the teacher's explanations, they reported that these explanations were important and contributed to their learning. This finding may perhaps be partially explained by the pupils' sense of commitment towards their teacher and good relations (relatedness) with the teacher, and the fact that the pupils consider that the teacher is extremely significant for their studies (Angres, 1994). These reports by the pupils may therefore be interpreted more accurately in terms of motivation theories, or in relation to their sense of belonging and self-efficacy (Deci & Ryan, 1985; Deci, 1971).

8.4.2 The findings relating to Question 2B

Analysis of the pupils' interviews provided the following findings with regard to Question 2B: *Which element of the combined teaching styles is reported as assisting pupils with a particular learning style?*

Analysis of the effect of the different teaching styles combined in the research lesson, shows that the pupils received different assistance from each teaching element. The Visual element was the most significant. Pupils reported it helped them to concentrate and pay attention, contributing to their sense of capability (Deci & Ryan, 1985; Deci, 1971). It should not be forgotten that in this case study the Visual element was used in combination with other elements and was found to be the most important, in contrast to findings of other researchers who found that the use of Visual elements in combination with other elements causes a cognitive burden that hindered learning (Scaife and Rogers, 1996; Lowe, 2003).

Why, in the present case was the Visual element seen as so significant? In her observations the researcher noticed that the pictorial animations in the presentation explained and clarified the grammatical words, enabling the pupils to pass from the abstract words to something more tangible for young pupils, exemplifying them and increasing comprehension. For example the difference between the verb 'slip' (Hehlich) and 'divide' (Hithalech). Both have similar sounds in Hebrew, the only difference between them being their construct and children tend to confuse these meanings but the pictorial animation clearly showed the difference, yet it caused no cognitive burden. The coloured emphases organised the material clearly for the pupils indicating the consistency of the Hebrew grammar. According to the pupils' testimony, the Visual elements added colour, interest, surprise and helped the pupils to concentrate their attention. These points may explain why the pupils thought that the Visual element was so important. In support of this finding, Barak et al. (2011) examined whether *'animations may hinder students' meaningful learning or evoke misunderstandings'* and found that animated films improved pupils' understanding in science lessons.

The present research findings indicated that the Auditory and Reading/writing elements assisted some pupils to concentrate and improved attention and helped others to understand the subject matter but supported the sense of capability for all pupils.

This finding is in line with the remarks by Cook (2010) and findings of a study by Lichtinger (2010). Lichtinger studied the influence of the learning environment on the pupils' self-regulation and motivation. Among other things she found that the extent of relevance of the task, characteristics of the task and pupils' feelings towards their teacher all influenced the pupils' motivation. This may also have been expressed in the present case study in which the Reading/writing tasks were adapted to be relevant to the knowledge transmitted simultaneously in the presentation in which simple texts summarised this knowledge.

Although a few pupils reported difficulty concerning the reading, when they succeeded in reading this gave them confidence and a sense of capability, which as Jacobson (2000) notes enables them to have more positive expectations of themselves for the future. This may be the explanation for the pupils' remarks that these elements (Reading/writing) helped them to have a sense of capability.

It was also found that the Kinaesthetic element helped pupils master and remember the subject matter, enhancing their sense of capability and their motivation to study. A search of the relevant literature failed to find information that either supports or contradicts these findings.

Although the observations indicated that the pupils were initially uncomfortable with the Kinaesthetic work, once they had overcome their initial difficulties they all without exception completed their tasks without asking for the teacher's assistance. It seems that the finding that the Kinaesthetic element helped them master and remember the subject matter can be perhaps be explained by the fact that once they completed the task they felt that they were able to perform it. Successful completion of the tasks seems to have improved their sense of self-efficacy (Deci, 1971; Deci & Ryan, 1985) and their motivation to learn.

As noted by Schun (1991) the fact that learners discover knowledge by themselves shapes their sense of self-efficacy through the performance of the task. Their sense that they are capable of performing something is created when they succeed in performing it, as a result of the experience and reactions

to their work that psychologically influence their belief in their capabilities and achievements (Bandura,1977).

8.4.3 The findings relating to Question 2C

Analysis of the pupils' interviews provided the following findings in response to Question 2C: *Do pupils with a combination of different learning styles that contains more than a single element report more assistance for their learning than pupils with a single element learning style?*

Interview findings showed that pupils with a combination of several elements were assisted by the research lessons to the same extent as pupils with a single element learning style, although it is noted that an exclusively V (Visual) learning style was not represented among the participants. Analysis of the questionnaires in relation to Question 1C shows a marginal hindrance that was identical for the two groups (single and composite styles), i.e. the lesson that combined multiple learning styles assisted and hindered both these groups to the same extent.

In the observations, it was noticed that the pupils were extremely active, Reading and Writing, raising their hands, answering questions and doing the Kinaesthetic work. Although the researcher had not originally intended to create lessons that included active learning, the observations showed that the combination of teaching styles including the Kinaesthetic work generated active study among the pupils, assisting pupils with all learning styles (Lujan and DiCarlo, 2006).

It was only with the help of interviews that the researcher could clearly see how each element of the combined teachings styles individually helped the pupils.

8.5 Findings relating to Research Question 3

The third research question examined:

How did pupils with different diagnosed learning styles respond to lessons that combined different teaching styles?

This question was examined in view of data from the observations from the two parts of all experimental lessons, during the presentation and when the pupils worked with the Kinaesthetic exercise book. During the presentation, the teacher provided oral explanations when explanation and emphasis were (in her opinion) needed. And in the second part of the lesson, pupils worked in groups on the Kinaesthetic activity that required comprehension of the task, practical work, and execution of the tasks. In this part of the lesson explanations were provided in the exercise books and the pupils assisted each other without assistance from the teacher.

The observations indicated that in general pupils exhibited satisfaction regarding the experimental lessons. They watched the presentation, gave the expected reaction to appropriate segments, laughed in the proper places, gave a high percentage of correct answers to the interactive questions, read and wrote upon request.

The exception was a small number of pupils who according to the results of the questionnaires, for reasons unrelated and independent of the studied issue (the pupils' reactions to the experimental lessons) did not cooperate with the Reading and Writing requirements. Although the pupils exhibited dissatisfaction with the teachers' oral explanations during the presentation, and were observed not cooperating when the presentation was halted and the teacher explained the subject matter in her own voice, they related to the teachers' explanations in the interviews as important for their studies, as specified above.

In the observation of the Kinaesthetic work, it was seen that some of the pupils whose learning style contained a Kinaesthetic element initially exhibited dissatisfaction concerning the tasks, some perhaps due to their difficulties in understanding the instructions for the given tasks, they expressed cognitive difficulty and requested the group's assistance. This correlates with the findings of Dobson's study (2010) indicating that pupils who preferred the K learning style sometimes required additional assistance in learning, except that participants in that research were adult pupils.

Other pupils who understood the task instruction did not want to begin working on the Kinaesthetic task. This finding corresponds with learning style theories,

suggesting that pupils, whose learning style does not include the Kinaesthetic element, find Kinaesthetic work more difficult and do not prefer it (Dunn, 1990; Felder, 2002).

The pupils helped each other in the groups. These factors are not discussed in detail in this study since the issue of peer assistance and group dynamics were outside the scope of this research. Felder et al. (1988) found that active pupils learn to understand and preserve information through active experiences with the subject matter, discussing and applying the knowledge or explaining it to others. They therefore preferred group work. The author suggests further study to examine the connection between active pupils, active experience, Kinaesthetic style and group work.

After the initial problems mentioned above were solved, all pupils in the class worked on their tasks and completed them successfully. Only one pupil required help from the teacher. All the others carried out the tasks with mutual peer assistance. As noted interpretative consideration of this peer assistance lies outside the boundaries of this study.

Observation results showed several pupils were hindered by the flowcharts. The author had added flowcharts to the presentation to express additional Visual elements (Felder, 2002). This finding correlates with the conclusions of Kafah's study (1997) that various cognitive skills and a high abstraction level are needed for the transition from graphic to verbal presentation needed to understand these charts. This explains the the reactions of some pupils. But this issue is outside the study boundaries and the author suggests further study on this matter.

To summarise the findings for the third research question that examined the responses of pupils with different learning styles to lessons that combined multiple teaching styles: it was seen that pupils were assisted by and enjoyed all the elements in the combination of teaching styles. As noted, Rose (2008) explained that every pupil is different so that multiple types of representations of knowledge are essential in the classroom. In his opinion, the more diverse the lesson, the more it contributes to learning.

8.6 Summary of the Discussion

The above discussion dealt with the relations between the findings relating to the research questions and the research's underlying conceptual and theoretical framework, the discussion was conducted in relation to all research questions.

The discussion dealt with the three research questions: the first question that examined whether the pupils were hindered in their learning as a result of the experimental lessons, the second question mainly examined whether the pupils were assisted in their learning by the different teaching elements of the combined lesson and the third that examined whether pupils with different learning styles responded differently to the combined teaching styles lessons.

This discussion confirmed that the data from the different data-collection tools: questionnaires, interviews and observations, mainly provided similar findings regarding the studied issues, providing strong validation for the findings and a robust foundation for the conclusions presented in the next chapter.

According to these findings it is clear, that all pupils enjoyed the lesson that combined different teaching styles, using each style for a short period of time during the lesson. It was also clear that the elements that did not correspond with their personal learning style did not hinder them, but actually assisted their learning This is in line with the suggestion of Baytiyeh and Naja (2010) that teachers should use multimedia interactive applications in order to promote active learning processes in the classroom.

The idea of adapting teaching methods to individual pupil's learning style preferences (Miller, 2001) is, in the author's view, unrealistic nor does it enable pupils to be exposed to and learn to cope with different teaching styles that exist in their surroundings. It is the teacher's duty to provide pupils with different options and exposure to different ways of receiving information from their surroundings (Tanner and Allen, 2004; Boella, 2010).

The author does not ignore Blummer and Hodkinson's (200) determination, that although leaning styles do exist yet they only constitute part of the individual's approach to learning, and the individual's psychological and social aspects must also be taken into account. However, one should not forget that

psychological and social aspects are also influenced by a positive learning experience (Willingham, 2010) an experience that in this case study was obviously provided by the lesson which combined different teaching styles. This was especially noticeable in the case of BJ, a pupil with special needs, whose successful learning achievements and positive evaluation from both teacher and pupils during the experimental lessons increased her motivation to study according to her own testimony and that of her teacher (see Appendix 9.1:Teacher's Report).

It is recommended by Willingham (2010) that emphasis should not be given to the pupil's own learning style but rather a combination of teaching styles should be provided in order to enable pupils to gain more value and enjoyment and enhance their motivation to study. Willingham asserts that it is extremely important for teachers to diversify their lessons with different teaching styles – Visual, Auditory, Reading/writing and Kinaesthetic, but each style should be applied for short time spans within the lesson. Lingering on a single style for a longer period of time should be avoided and indeed when the teachers' oral explanations were too lengthy in this study, they were found to have negative effects. The author suggests further study should examine optimal time spans for the use of each style. The author also joins Dede (2009) in the call to adopt innovative, creative approaches and try to combine media used naturally by pupils and close to their hearts, in order to facilitate learning. The results of studies by Rogers (2009) and Barak et al. (2011) support the above findings concerning the positive effects of integration of different styles within school lessons. Nevertheless, attention is drawn to the study by Eshet and Chajut (2007) which found that those with a dominant right hemisphere and males preferred a constructed presentation to writing tasks. This means that construction of a presentation to be applied sweepingly to all learners may fail to apply the new technology with sufficient consideration for their different preferences.

In summary, although today learning styles are often considered unfashionable, or at least ambiguous and their applicability is disputed (Wilson 2010; Boella 2010), the author believes that attention should be given to all facts relating to learning styles and that they should not be ignored when preparing learning

programmes. Every person intuitively knows that they have their own specific manner in which they perceive, understand and organise their learning. The author observed that the pupils were assisted by the lessons combining all learning styles. In addition, the lessons provided immediate feedback to questions asked in the presentations assisted by the teacher's explanations and the help of other pupils in the Kinaesthetic work in the classroom. The author found this combination of teaching styles caused only a very slight rate of hindrance to the pupils' learning. Although this was extraneous to the research goals, the author also found that studying in this manner increased pupils' motivation and achievements, according to the teachers' reports, research findings and the pupils' scholastic and social achievements in the field. The author recommends that teachers should learn from these results and that further study should relate to this phenomenon from other aspects.

8.7 The Contribution to Knowledge

8.7.1 Filling the identified gap in knowledge

Data collected with the different research tools presented a rich in-depth understanding of the studied phenomenon: whether the combination of different (V, A, R and K) teaching styles hindered or assisted the learning of pupils with different learning styles.

Additionally this study identified new connections between the various factors involved in the phenomenon and produced novel and profound insights and explanations concerning the studied phenomena.

The following are the main original findings of this study which add to extant knowledge concerning consideration for the VARK learning styles in primary school lessons, helping to fill the gap in knowledge.

- As far as the researcher could ascertain, this is the first time that research found that a lesson combining multiple teaching style elements assisted or (marginally) hindered pupils with composite learning styles to the same extent as it assisted or hindered pupils with a single element learning style.

- Another original finding of the research was that a Visual teaching style, employed within a combination of teaching styles was the most significant element for the pupils. This element assisted pupils to listen and concentrate and improved their sense of capability.
- In contrast to previous studies, this research found that Visual elements employed within a combination of teaching styles did not hinder learning (Scaif & Rogers, 1996; Lowe, 2003).
- A further contribution to extant knowledge is the finding that pupils diagnosed with a Kinaesthetic style need more assistance with oral explanations by the teacher than pupils with other learning styles. During the Kinaesthetic part of the lesson most of these pupils with a Kinaesthetic style needed assistance from their peers to understand the cognitive requirements of the tasks.
- This was the first time that an association was found between the different teaching styles applied in the lesson and expressions of the pupils' motivation. It seems that all the elements of the lesson (V,A, R, K and a) assisted all the pupils to feel a sense of capability with regard to their learning, thus improving their motivation to learn.

Additionally the research contributed an innovative useful and effective tool that enables the creation of lessons that combine different teaching styles that accord with the pupils' learning styles

- This research invented and applied an interactive multimedia presentation together with Kinaesthetic work and the teacher's oral explanations. Each teaching style was used for a short period of time during the lesson. This tool was applied to Hebrew grammar lessons in an Israeli primary school, however, it is suggested that this tool may be applicable for other disciplines and with other age groups and localities.

Additionally the research contributed to the theoretical corpus of knowledge in the field of learning style theory:

- The research investigated the applicability of the theories of Dunn and Dunn, Felder and Silverman and Fleming to the learning process of primary school pupils in Hebrew grammar lessons, and added data

which reinforced the assumption that learning styles are relevant to the pupils' learning process. This was reflected by the fact that the combination of learning styles presented in the experimental lessons assisted the pupils' sense of capability and achievements.

CHAPTER 9: CONCLUSIONS

This chapter presents the conclusions derived from the discussion of the findings in the previous chapter. The order of presentations follows the Research Questions which led to these conclusions

The current study examined whether lessons that combine different teaching styles (Visual, Auditory, Reading/writing and Kinaesthetic) hinder or assist the learning of primary school pupils with different personal learning styles, according to the pupils' responses. This was achieved by investigating which of the perceptive elements of the teaching styles were experienced by the pupils as assisting their understanding and mastery of the studied learning material, their concentration abilities, memory and motivation in relation to their own specific learning style, attempting to determine whether certain elements were experienced as facilitating these processes, or if there were elements, which were experienced as hindering these processes because they were ineffective or superfluous or distracting.

9.1 The Research Conclusions

The following conclusions stem from the findings of the study:

* The main conclusion from this study is that a lesson combining Visual, Auditory, Reading/Writing and Kinaesthetic teaching styles was accepted by the large majority of pupils without any relation to their learning style. Not only did the combination of teaching styles not hinder the pupils, on the contrary, it assisted their learning and generated their active, conscious cooperation.

* A second conclusion that supports the first conclusion and slightly extends its content is: the lesson combining Visual, Auditory, Reading/Writing and Kinaesthetic teaching styles either hindered or assisted pupils with a single element learning style, to the same extent that it hindered or assisted pupils with several elements in their learning styles.

* The element of the combined teaching styles that marginally hindered pupils' learning processes more than the other elements was the Kinaesthetic element. Teachers' oral explanations marginally hindered pupils whose learning style did not contain the Auditory element but hindered all pupils' learning when the teacher talked continuously for a lengthy period of time. The need to read aloud and write from the presentation was somewhat arduous for pupils whose learning style did not contain the Reading/writing element.

In the lesson combining Visual, Auditory, Reading/Writing and Kinaesthetic teaching style elements:

* The Visual element provided pupils with the most significant assistance, helped them concentrate and pay attention and contributed to their sense of ability to learn.

* The Auditory and Reading/writing elements helped some pupils concentrate and listen, helped others understand the subject matter and contributed to all pupils' sense of capability to learn.

* The Kinaesthetic elements helped pupils master and remember the subject matter, facilitated their sense of capability to learn and increased their motivation to study.

* The teacher's oral explanations as an Auditory element provided all pupils with a sense of capability, especially for pupils with a Kinaesthetic learning style.

* Two groups of pupils, pupils with an R (Reading/writing) learning style and pupils with a VARK group were marginally hindered by the teachers' oral explanations (a).

* Flowcharts employed in the presentation did not capture the pupils' attention.

During the Kinaesthetic part of the lesson it was evident that most of the pupils did not enjoy the Kinaesthetic work although they eventually completed it and then felt a sense of capability.

An additional result of the lessons that combined Visual, Auditory, Reading/Writing and Kinaesthetic teaching styles was that there was an obvious improvement in the participation and achievements in grammar lessons of a special education pupil integrated within the regular class.

9.1.1 Conceptual conclusions

In the theoretical discourse on learning styles there is a controversy debating whether it is necessary to adapt teaching styles to the learning styles of pupils (Wehrwein, 2007; Carrier, 2009; Fountain & Alfred, 2009; Howles & Jeong, 2009; Naimie, et. al., 2010) or to teach with teaching styles that are different from pupils' learning styles in order to broaden the pupils' abilities (McCarthy, 1990; Tanner & Allen, 2004; Boella, 2010). The present research demonstrates that as long as the lesson integrates several different learning styles (VARK) each of them for a short duration during the lesson, pupils (even pupils who have special needs and new immigrant pupils) gain a lot from these lessons. The Visual element of the lesson was found to be especially meanningful in holding the pupils attention and improving their understanding and motivation to learn, irrespective of their personal learning styles.

9.2 Critique and Limitations of the Research

Although all the above conclusions were reinforced by triangulation of findings from various data sources (interviews, questionnaires and observations), the following research limitations are noted:

* It is noted that the definitions of Visual, Auditory, Reading/writing and Kinaesthetic elements employed in the study may not be conclusive. For example, is a flowchart a visual element?

* The fact that the Kinaesthetic teaching element could not be included and integrated within the interactive presentation that constituted 75% of each lesson meant that this activity was carried out as a separate activity towards the end of the experimental lesson, and these circumstances may have influenced the findings concerning the effect of this element.

* Sometimes, allowing subjects to read the results of a study and comment on them may be an advantage, but in the present case this was considered impractical since the Year 6 pupils had left the school and were busy transferring to middle school while the Year 5 pupils were occupied with National Standard exams.

* Three different classes participated in this study with two different teachers. The teachers were different in nature, in the manner in which they received the author and her instruction, in the way they taught and used the presentation and in the pupils' reactions towards them. These facts may have influenced the data and interpretation of the conclusions. However, this variation, on the other hand, may have contributed to the diverse results, diversity that enriched and deepened study results.

* This study was based on observations, questionnaires and interviews in three classrooms with a population of 75 pupils. Interviews were held in one classroom only (see explanation in Section 5.1.2). Although this study provides significant results, perhaps a larger number of pupils would have produced different results and furthermore, had the author conducted interviews in all three classes this would have given further reinforcement to the results.

* The interactive presentation constructed by the author in order to teach grammar with a combination of three of the teaching style elements (Visual, Auditory, Reading/writing) was a unique tool constructed by the author in collaboration with a grammar teacher. The selected subject matter, characteristics of the Visual and Auditory elements and the Reading/writing segments, were all unique properties of this case study. The results may therefore be unique to the employment of this specific tool and other methods of combining these elements may produce different results.

* The interviews in this study were held at different times. Had the author interviewed all the pupils on a single occasion, she would perhaps have received additional or more uniform information.

* Since the interviews were semi-structured and the pupils aged 10-12, the author may have received responses that were not completely valid and significant (Garcia and Pintrich, 1995), however, the author attempted to overcome this by asking the same question more than once in different phrasings.

* The interviews were conducted and taped in Hebrew and despite professional linguistic editing of the text, imprecise translation may have caused some change in their meaning due to translation. Translations of the words of the pupils and teachers from Hebrew to English may be imprecise and not truly convey their intentions.

9.2.1 The research boundaries as a limitation

In addition to the above limitations the research study boundaries may limit its generalisability.

* The study was carried out at G School in the north of Israel, in three classes, two Year 5 and one Year 6, 11-12 year old pupils, in a single academic year. Due to holidays and examinations (see information about the school, Section 3.9.1) not all scheduled grammar lessons were held, and each class received 10-13 grammar lessons. The specific circumstances of the study limit its generalisation.

* The study only relates to the effects of different teaching styles on specific aspects of the learning processes of pupils with different learning styles (concentration in lessons, absorption, mastery and memorisation of subject matter). There was no attempt to examine academic achievements following the lessons, or the influence of the lessons according to pupils' gender, nor did the research explore psycho-social aspects of the learning or other aspects pertaining to the pupils and their learning, matters which were all considered beyond the scope of this study.

9.2.2 Further limitations: Qualitative research

Most of the restrictions of this study stem from the fact that the core methodology of the study had a qualitative nature. Its advantages are also its limitations. The author was part of the study, necessitating the inclusion of subjective elements. Although subjectivity on the one hand enables intimate understanding of the studied objects and phenomenon, on the other hand such subjectivity may also hinder and influence findings.

When the author interviewed the pupils, she could only rely on what they said, but they may have had motives, ideas or feelings that were not expressed and the pupils were unaware of during the interviews. Furthermore, the pupils may have attempted to provide responses that would impress the author, a tactic that could have influenced data, creating the Hawthorne Effect (Rosenthal and Jacobson, 1968). Moreover, the pupils were aware that the objective of the study was learning styles. This knowledge may have influenced their responses. All these issues may detract from the validity of this study. The author attempted to neutralise these effects by telling the pupils it was important to provide authentic answers and explaining she would not use the data provided for anything but the study, and even the study itself would not contain pupils' names, only their initials. Furthermore, data would not be provided to the teachers, parents or school management.

The author also examined every issue by asking different questions which approached each subject from several different angles. Additionally, throughout her contact with the pupils, the author refrained from expressing her own opinions on the lessons or their effect.

The data was collected in different ways, including interviews with pupils, observations and questionnaires. The variety of data-collection approaches was designed to overcome the difficulties specified above and reinforce validity by obtaining a more complete picture.

As explained in the Chapter 3: Methodology, the findings of this study are specific to grammar lessons. Had the author made a presentation in another class, other than grammar, perhaps the results would have been different. For

example, mathematics lessons, by their very nature, restrict the use of Visual elements.

The validity of the study is achieved by the comprehensive description and analysis of the data provided by the author. The reliability of the study, similarly, was achieved by the comprehensive description concerning the way in which the study was carried out. Thus, the author describes all research circumstances in detail allowing the readers to decide whether the results are logical and consistent, and whether they are applicable to their own circumstances and specific cases, making a naturalistic generalisation from the results.

This study could have been carried out in other ways, using other paradigms, methods and tools. For example, it could have been an exclusively quantitative study examining results of learning styles in comparison to control groups. And indeed some of the author's recommendations for additional research relate to other methods.

9.3 Recommendations

This case study focused on a single case, lessons that combine multiple teaching styles in grammar lessons in three Israeli elementary school classes during a single academic year.

The choice of the above case was inspired by observation of the pupils' learning and concentration difficulties during lessons and a desire to facilitate learning of pupils with different learning styles under the assumption that the learning of pupils with a particular learning style might be hindered or assisted by a particular teaching style. The studied case was examined in detail in order to understand the studied phenomena, derive conclusions and provide recommendations. Other researchers who read this study may decide how to apply the results, conclusions and recommendations they read here to other, similar cases. In addition the following recommendations

* The first recommendation is to diversify lessons and present lessons which include all Visual, Auditory, Reading/Writing and Kinaesthetic

elements. The study determined that such lessons do not hinder pupils, but on the contrary, they assist them and diversify the lesson. The idea of preparing a lesson for each pupil according to his specific learning style is impractical and as one can see from this study is also unnecessary, since the combination of all the elements does not constitute an obstacle for either pupils with a single element in their learning style or pupils with several elements in their learning styles.

* When diversifying the lesson by using different teaching elements, attention should be paid to the extent of diversification. Each style should be used for short time spans, e.g. pictorial animation, then something in writing, followed by narration. A single element should not be used for a lengthy period of time, as the study discovered for example: the teacher's oral explanation sometimes seemed too lengthy and pupils felt that it hindered their learning.

* An important recommendation is the need for the teacher's mediation in the classroom. Although the findings showed that when the teacher spoke for a long period of time it caused a hindrance to the pupils, nevertheless in their feedback they emphasised the importance of the teacher's oral explanations since it strengthened their sense of ability and belonging.

* In primary school classes discretion should be applied concerning the inclusion of Visual elements, and the inclusion of flowcharts and graphs as Visual elements may be inappropriate for primary school classes, since according to the results of the current study pupils were fascinated and fixed their attention on pictorial animation and colours but stopped watching and cooperating when the presentation displayed flowcharts and graphs..

* Discretion should also be applied with regard to the teacher's request that pupils read texts aloud in front of the other pupils as a "Reading" element. This was considered a hindrance by some pupils who were unwilling to read aloud to their peers. This was especially so for a pupil who was a recent immigrant. It is therefore recommended that pupils

should not be asked to read aloud in the classroom unless they specifically volunteer to do so.

* It is important to include a writing element in the lesson. Although this study found that the writing element marginally disturbed a minority of pupils, nevertheless this element was also found to contribute to comprehension of the subject matter for some pupils and assisted others to concentrate and pay attention.
* Lessons that integrate elements of different teaching styles should be tested for pupils with special needs and in special education classrooms, since this study found that these lessons substantially increased the motivation, awareness, and attention and achievements of a special education pupil (see Appendix 9.1: Report by the Teacher concerning the transformation that this pupil underwent.
* Teachers should explain the Kinaesthetic tasks to their pupils before they begin working on them in order to anticipate and cope with the finding that the pupils required explanations about the requirements of the Kinaesthetic tasks.
* Teachers should take account of the fact that pupils diagnosed with a Kinaesthetic learning style are particularly in need of their mediation since the teacher's explanations were deemed important by these pupils to support their sense of ability.
* Teachers and educators should also be aware that the Visual teaching element was shown to be the most significant teaching element for the studied primary school pupils and therefore the recommendation is to include this element in lessons to a larger extent. This study also found that the Visual element supported the pupils' sense of capability to study.

9.3.1 Recommendations for further research

The issue of leaning styles has been studied extensively but in the meantime the world has changed, cyberspace has grown and it is impossible ignore the fact that today's pupils have different needs. Still, the distance between theory

and educational performance in the field is large and in the classrooms, the situation has unfortunately remained unchanged.

The author would like to propose additional studies that could shed light and perhaps help to understand the issue of learning styles and teaching styles and their influence on learning processes.

* An examination of the effect of diversified lessons combining multiple teaching elements, to discover whether such lessons hinder or assists pupils according to their learning styles on a larger research population and/or long-term study and/or in populations of different ages and/or special education population.
* An examination of the relationship between leaning styles and group work, shedding light on the influence of the combined teaching styles on pupils' group work, to determine whether the learning styles of the different pupils in every group be included in the lesson?
* An examination of the optimal time span for every element in the lesson combining different teaching styles.
* Further study that would examine whether pupils whose learning style lacks the Kinaesthetic element are able to improve their Kinaesthetic skills in a lesson which includes Kinaesthetic tasks.

REFERENCES

Adar, L., Amir, B., Ben Peretz, M., Gordon, D., Rich, A. Reshef, D. & Shatal, A., 1981. Teaching in heterogeneous classes. *Seminar report prepared as part of the Israel-USA Cultural Exchange 1979-1981.* Jerusalem. [Hebrew]

Agar, Michael 1980. Hermeneutics in anthropology: A review essay. *Ethos*, 8, 253-272.

Alexander, R., 2000. *Culture and pedagogy: international comparisons in primary education*. Oxford: Blackwell.

Alfasi, M., 2002. *Fostering literacy in a learning community*. Paper presented at the AYALA Convention 4. Ramat Gan, Israel. [Hebrew].

Alloway, T. P., 2010. *Improving Working Memory: Supporting Students' Learning*. London: Education at SAGE

Almog, O., 2004. The hidden reasons for the crisis in the education system. A day seminar entitled: *Reforms in Education- The Desire to Change and the Chances of Success*, MOFE"T Institute, Jerusalem. [Hebrew]

Almog, T., 1997. From windowpanes to screens: Computers in school during the transitional period. *Computers in Education,* 41, pp. 4-7. [Hebrew]

Ames, Carole, 1990. Motivation: what teachers need to know. *Teachers College Record*, 91(3), pp. 409-421.

Angres, J., 1994 *Waldorf schools*. Haifa: Gestlite

Arksey, H. & Knight, P., 1999. *Interviewing for social scientists*. London: Sage Publications.

Aronson, E., 1978, *The jigsaw classroom*. Beverly Hills: Sage Publications.

Assor, A., 2001. *Enhancing intrinsic motivation for school learning in Hebrew. Motivation for Learning in School - Theory and Practice*. A. Kaplan and A. Assor, Branco-Weiss Institute. 20, pp. 167-190.

Assor, A., 2003. School support for mental needs and encouragement of self-attentiveness and attentiveness to others. In R. Abiram, ed. *The Future School*. Tel Aviv: Massada, pp. 165-210. [Hebrew]

Assor, A., 2005. Fostering internal motivation for learning in school. *Auracia*, 20, pp.1-21. [Hebrew]

Assor, A. & Kaplan, A., (2001). Motivation for learning in school – In practice. *Thinking Education*, 20, pp. 8-24. [Hebrew]

Assor, A., Kaplan H. & Roth G., 2002. Choice is good, but relevance is excellent: Autonomy-enhancing and suppressing teacher behaviours predicting students' engagement in schoolwork. *British Journal of Educational Psychology*, 722, pp. 261-278.

Assor, A., Kaplan, H., Kanat-Maymon, Y. & Roth, G., 2005. Directly controlling teacher behaviors as predictors of poor motivation and engagement in girls and boys: The role of anger and anxiety. *Learning and Instruction,* 1(55), 397-413.

Atkinson, R. C. & Shiffrin, R. M., 1968. Human memory: A proposed system and its control processes. In K. W. Spence and J. T. Spence, eds. *The psychology of learning and motivation: Advances in research and theory*. New York: Academic Press, Vol. 2, pp. 89-195.

August-Dalfen, S. & Snider, L., 2003. A multimedia case based approach to the study of ergonomics. *Journal of Prevention, Assessment and Rehabilitation*,201, pp. 3-11.

Ayalon, L., 2008. Cognitive functioning of Israelis 50 years-old and above. *Social Confidence*, 76, pp. 225-246.

Baddeley, A. D., 1990. *Human memory: Theory and practice*. Oxford: Oxford University Press.

Baker, A. E., 2007. Developing preservice literacy teachers' observation skills: Two stories, two technologies. *Technology and Teacher Education.* 74, pp. 293-317. AACE.

Bandura, A., 1977. Self-efficacy: Towards a unifying theory of behavioral change. *Psychological Review*, 84, pp. 191-215.

Bandura, A., 1986. *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A., 1997. *Self-efficacy: The exercise of control*. New York: Freeman.

Barak, Miri, Ashkar, Tamar & Dori, Yehudit J., 2011. Learning science via animated movies: Its effect on students' thinking and motivation. *Computers and Education*, 56(3), 839-846.

Barbe, W. & Swassing, R., (1979). *Swassing-Barbe Modality Index*. Columbus, HO: Zaner- Bloser.

Barkai, A., Alexander, G. & Kozminski, A., 2004. Evaluation of multimedia presentations produced by learners: Evaluative perceptions of pupils, teachers, mentors and student-teachers. *Script*, 8, pp. 127-149. [Hebrew]

Barkan, H., 2003. *The effect of preschool children's social cognitive abilities on their peer sociometric status and behavioral evaluations.* Ramat-Gan: Bar-Ilan University. [Hebrew].

Bar Lev, B, & Maoz, D., 1992. *Learning styles and their application in the classroom.* Tel Aviv: The Institute for the Improvement of the Education System. [Hebrew]

Barth, R., 1980. *Run school run*. Cambridge, MA: Harvard University Press.

Baturay, Meltem Huri, Daloglu, Aysegul & Yildirim, Soner (2010). Language practice with multimedia supported web-based grammar revision material. *ReCALL*, 22, 313-331 doi:10.1017/S0958344010000182

Baykan, Z. & Naçar M. 2007. Learning styles of first-year medical students attending Erciyes University in Kayseri, Turkey. *Advances in Physiological Education*, 31,158-160,

Baytiyeh, H. & Naja, M., 2010. Do multimedia features promote understanding and retention. *International Journal of Instructional Media* 371, pp. 43-53.

Ben Ari, R. & Eliasi, L. 2005. *From frontal teaching strategy to complex teaching strategy.* Beer Sheva: Magamot Publishers. [Hebrew]

Bettler, R., 1996. The will to learn: Motivation for learning and its implications for psychological-counselling work in school. In A. Lest, & S. Zilberman, eds. *Issues in school psychology: Considerations and applications.* Jerusalem: Magnes, pp. 50-75. [Hebrew]

Bion, W. R., 1962. *Learning from experience*. London: Karnac Books.

Bloomer, M. and Hodkinson, P., 2000.Learning careers: continuing change in young people's dispositions to learning. *British Educational Research Journal*, 26, 583–597.

Boella, Luci, 2010. 'But I can't learn like that Miss, I'm a visual learner!' *Education Now*, 6. Kingston upon Thames: Croner.

Bogdan, R. & Biklen, S., 1982. *Qualitative research for education: An introduction to theory and methods.* Boston: Allyn and Bacon.

Brandt, R., 1990. On learning styles: A conversation with Pat Guild. *Educational Leadership*, 48(2),10-12.

Briggs-Myers, I. & Myers, P. B., 1980. *Gifts differing, Understanding personality type*. Palo Alto, California: Davies-Black Publishing.

Brinker, R., Yosefon, M. Hacham, A . & Zehavi, I., 1994. Adaptive teaching in a heterogenic class, a unitary approach. Tel Aviv: Centre for Educational Technology. [Hebrew]

Brown, A. L., 1987. *Metacognition, executive control, self-regulation, and other more mysterious mechanisms*. In F. E. Weinert and R. H. Kluwe, eds., *Metacognition, motivation, and understanding.* Hillsdale, NJ: Lawrence Erlbaum. pp. 65-116.

Broza A. &Ben-David Kolikant, Y., 2010. Use of the context story to significantly lever learning among sub-achieving pupils in mathematics: comparison between visual dynamic mediation and textual mediation, *Dafim* 50, 220-252. [Hebrew]

Bryman, A., 2001. *Social research methods*. Oxford, Oxford University Press.

Burns, D. E., Johnson, S. E. & Gable, R. K., 1998. Can we generalize about the learning style characteristics of high academic achievers? *Roeper Review*, 20(4), 276-281.

Butler, K., 1984. *Learning and teaching style, In theory and practice*. Maynard, MA: Gabriel Systems.

Cannel, C. F. & Kahn, R. L., 1968. Interviewing. In G. Lindzey & E. Aronson, eds. *The handbook of social psychology*. 2nd ed., Reading, MA, Addison-Wesley. Vol. 2, pp. 526-595.

Caplan A., Ben Gadi, A. & Eyal, N., 2007. An academic course in India – Management, Indian culture: Exemplifying the teaching of experiential learning. *Al Hagova Reaching High*, 6, pp. 19-22. [Hebrew]

Carmi, G. & Buhnik, D., 2008. Thinking styles in virtual learning on the net. In Y. Eshet, A. Alkalai, A. Caspi and N. Geri, eds. *Book of the Chase Conference for Learning Technology Researches 2008: The Learning Man in the Technological Age.* Raanana: The Open University. [Hebrew]

Carrier, S., 2009. Environmental education in the schoolyard: learning styles and gender. *Journal of Environmental Education*, 40(3), pp. 2-12.

Carroll, J. B., 1963. A model of school learning. *Teachers College Record*, 64, pp. 723-733.

Chapman, N. and Chapman, J., 2009. *Digital Multimedia*. Chichester, New York: Wiley.

Charmaz, K. 1995. Grounded theory. In J. A. Smith**,** R**.** Harréand, L**.** van Langenhoveeds. *Rethinking Psychology*, pp. 27-42. London: Sage Publications

Charmaz, K., 2000. Grounded theory: Objectivist and constructivist methods. In N. K. Denzin and Y. S. Lincoln, eds. *Handbook of qualitative research*. London, Sage Publications, pp. 509-535.

Chen, D., 2006. *Experimental schools: Manufacturers of innovation in education*. Tel Aviv: University of Tel Aviv – Ramot. [Hebrew]

Clark, R. C. & Mayer, R. E., 2003. E-learning and the science of instruction: Proven guidelines for consumers and designer of multimedia learning. San Francisco, CA: Jossey-Bass/Pfeiffer.

Coffield, F. D., Moseley, E. Hall & Ecclestone, K., 2004. Learning styles and pedagogy in post-16 learning. Available at Learning and Skills Research Centre site. Available at: www.LSRC.ac.uk(accessed: 27 June 2010).

Cohen, I. & Gerber, N., 2003. *Introduction to multimedia.* Available at:

http://vlib.eitan.ac.il/multimedia3/multimedia_definition.html(Accessed: May, 2010). [Hebrew]

Cohen, L., Manion, L. & Morrison, K., 2001. *Research methods in education*. NY: Routledge.

Cohen-Mansfield, J., Gruber-Baldini, A., Culpepper W., & Werner, P., 1996. Longitudinal changes in cognitive functioning in adult day care participants. *Journal of Geriatric Psychiatry and Neurology*, 9, pp. 30-38.

Compulsory Education Law, 1941. Available at Shatil – Innovation of the New Israel Fund at: http://www.shatil.org.il/sites/arabedu/library/1199371712 (accessed: 4/04/2011) [Hebrew]

Connell, J. P., 1991. Content, self, and action: A motivational analysis of selfsystem processes across the life span. In D. Cicchetti and M. Beeghley, eds. *The self in transition: Infancy to childhood*. Chicago: University of Chicago Press**,** pp.61-79.

Cook, R., 2010. 'Clickers' and the Bloom Theory in teaching. *Hed Haulpan Hahadash*, 96, 73-78. [Hebrew]

Corballis, M. C., 1966. Rehearsal and decay in immediate recall of visually and aurally presented items. *Canadian Journal of Psychology*, 20, pp. 43-51.

Creswell, J. W., 1998. *Qualitative inquiry and research design: Choosing among five traditions.* London: Sage.

Creswell, J. W. & Plano Clark, V. L., 2007. *Designing and conducting mixed methods research.* Thousand Oaks, CA: Sage.

Crowder, R. G. & Morton, J., 1969. Precategorical acoustic storage (PAS). *Perception and Psychophysics*, 5, pp. 365-373.

Curry, L.,1983. An organization of learning styles theory and constructs. *In* L. Curry, ed. *Learning style in continuing medical education.* ERIC *Reproduction* Document ED 235 185

Curry, L., 1987. *Integrating concepts of cognitive learning style: A review with attention to psychometric standards*. Ontario: Canadian College of Health Science Executives.

Deci, E. L., 1971. Effects of externally mediated rewards on intrinsic motivation. *Journal of Personality and Social Psychology*18, pp. 105-115.

Deci, E. L. & Ryan R. M., 1985. *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.

Deci, E. L., Ryan, R. M. & Williams, G. C., 1996. Need satisfaction and the self-regulation of learning. *Learning and Individual Differences*, 8, pp.165-183.

Dede, C. (2009). *Augmented reality technology brings learning to life*. Available at: http://www.gse.harvard.edu/blog/uk/2009/09/augmented-reality-technology-brings-learning-to-life.html [accessed 2/2011]

Denham, S. A., McKinley, M., Couchoud, E. A. & Holt, R., 1990. Emotional and behavioral predictors of peer status in young preschoolers. In H. Barkan, *The effect of preschool children's social cognitive abilities on their peer sociometric status and behavioral evaluations*. Ramat-Gan: Bar-Ilan University,

Denzin, N. K., 1970. *The research act in sociology*. London: Butterworth.

Denzin, N. K. & Lincoln, Y. S.,1994. *Handbook of qualitative research*. ThousandOaks, CA: Sage.

Dewey, J., 1916. *Democracy and Education*. New York: The Free Press.

Dewey, J., 1933. *How we think: A restatement of the relation of reflective thinking to the educative processs*. 2nd ed. Boston, MA: D. C. Heath.

Dobson J. L., 2010. A comparison between learning style preferences and sex, status, and course performance. *Advanced Physiological Education*, 34(4): 197 - 204.

Dovrat, S., 2005. *The national program for education.* Available at: http://cms.education.gov.il/educationcms/units/ntfe/hdochhsofi/dochsofi.htm (accessed: 3.2011) [Hebrew]

Driver, R. & Oldham, V., 1986. A constructivist approach to curriculum development in science. *Studies in Science Education*, 13, pp. 105-122.

Dunn, R., 1990. Answers to questions on learning styles. *Educational Leadership*, 48(2), 15–19.

Dunn, R., 2000. Learning styles: Theory, research, and practice. *National Forum of Applied Educational Research Journal*, 13(1), 3-22.

Dunn, R., 2004. *Professor Rita Dunn's Response to Coffield Report*. Available on-line at: http://www.learningstyles.net/documents/Response%20to%20Coffied%20Report%20by%20Professor%20R%20Dunn.pdf [accessed: 3.2011]

Dunn, R. & Dunn, K., 1972. *Practical approaches to individualising instruction: Contracts and other effective strategies*. Englewood Cliffs, NJ: Prentice-Hall.

Dunn, R. & Dunn, K., 1978. *Teaching students through their individual learning styles: A practical approach*. Reston Pub. Co, Reston Va.

Dunn, R. & Dunn, K., 1979a. Learning styles/teaching styles: Should they… can they… be matched?. *Educational Leadership*, 36, 238-244.

Dunn, R. & Dunn, K., 1979b. Testing your diagnostic, prescriptive skills. *NASSP Bulletin*, 63, p. 424.

Dunn, R. & Dunn, K., 1993. *Teaching secondary students through their individual learning styles: Practical approaches for grades 7-12*. Boston, MA: Allyn & Bacon.

Dunn, R. & Dunn, K., 1999. *The complete guide to the learning styles inservice system*. Boston, MA: Allyn & Bacon.

Dunn, R., & Dunn, K. (2005). Thirty-five years of research on perceptual strengths: Essential strategies to promote learning. *The Clearing House,* 78(6), 273-276.

Dunn & Dunn website 2011 http://www.learningstyles.net/en/teaching-resources/web-links-ideas [accessed: 3/2011]

Eizenberg, I., 1997. Putting the genie back in the bottle*. Computers in Education*, 42, pp. 7-14. [Hebrew]

Dunn, Rita Stafford & Griggs, Shirley A. eds. 2000, *Practical approaches to using learning styles in higher education* Westport, CT: Bergin & Garvey.

Dunn, R, & Griggs, S. A., eds. 2000, Practical approaches to using learning styles in higher education Westport, CT: Bergin & Garvey.

Eshet, Y. & Chajut, E., 2007. Living books: The incidental bonus of playing with multimedia. *Journal of Educational Multimedia and Hypermedia,* 16, pp. 377-388.

Feitelson, D., 1965. *Factors for failure in Year 1*, Jerusalem: Kiryat Sefer [Hebrew]

Felder, R. M., 2002. *Learning and teaching styles in engineering education.* Available at:http://www4.ncsu.edu/unity/lockers/users/f/felder/public/Papers/LS-1988.pdf (accessed: 29.3.2011).

Felder, R. M. & Silverman, L. K., 1988. *Learning and Teaching Styles in Engineering Education*. 78(7), pp. 674-681.

Felder, R.M. & Spurlin, J.E., 2005. Applications, reliability, and validity of the Index of Learning Styles. *International Journal of Engineering Education,* 21(1), 103-112.

Felder, R. M., & Soloman, B. A., (1999). *Index of learning styles questionnaire*. Available at: NC State University site: http://www.engr.ncsu.edu/ (accessed 3.2011).

Feldman, T., 1994. *Multimedia*. London: Chapman&Hall

Fischer, B. & Fischer, L., 1979. Styles in teaching and learning. *Educational Leadership*, 36, 245-254.

Flavell, J. H., 1971. First discussant's comments: What is memory development the development of?' *Human Development***,** 14, pp. 272-278.

Flavell, J. H., 1976. Metacognitive aspects of problem solving. In L. B. Resnick, ed. *The nature of intelligence.* Hillsdale, NJ: Lawrence Erlbaum, pp. 231-235.

Flavell, J. H., 1979. Metacognition and cognitive monitoring: A new area of cognitive-developmental inquiry. *American Psychologist*, 34(10), pp. 906-911.

Fleming, N.D., 1995. I'm different; not dumb. Modes of presentation (VARK) in the tertiary classroom, in Zelmer, A., (ed.) *Research and Development in Higher Education, Proceedings of the 1995 Annual Conference of the Higher Education and Research Development Society of Australasia* (HERDSA),HERDSA, Volume 18, pp. 308 – 313. Available at:

http://www.VARK-learn.com/documents/different_not_dumb.pdf (accessed: 2.2011).

Fleming, N. D. & Mills, C., 1992. Not another inventory, rather a catalyst for reflection. *To Improve the Academy*, 11, 137-155.

Fleming, Neil, 2001-2010, Internet site: http://www.vark-learn.com/english/page_content/multimodality.htm)

Fontana, A., and Frey, J. H. 2000. The interview: From structured questions to negotiated text. In N. K. Denzin and Y. S. Lincoln eds. *Handbook of Qualitative Research* 2nd Ed. pp. 645-672. London: Sage Publications.

Fountain, R.A., & Alfred, D., 2009. Student satisfaction with high-fidelity simulation: Does it correlate with learning styles? *Nursing Education Research*, 30(2), pp. 96-98.

Frank, A. & Bernstein, T., 2002. *Effective decentralized learning in the Tegrity system environment*. Computer Science Department, University of Tel Aviv. Available at: http://www.biu.ac.il/bar-e-learn/kenes/e2/frank-e2.htm Accessed: May, 2010.

Gagne, R. M., ed. 1967. *Learning and individual differences*. Cleveland: OH: Charles E. Merrill.

Garcia, T. & Pintrich, P. R. 1995. *Assessing Students Motivation and Learning Strategies: The Motivated Strategies for Learning Questionnaire*. Meeting of the American Educational Research Association.

Gardner, H., 1983. *Frames of mind: The theory of multiple intelligences*. New York: Basic Books.

Gardner, H., 1996. *Multiple intelligences, The theory in practice.* Jerusalem: Branko Weiss Institute. [Hebrew]

Gazit, E. &GG, D., 2003. Using the observer to analyze learning in virtual worlds. *Behavior Research Methods, Instruments, & Computers*, 353, pp. 400-407.

Geertz, C., 1973. *The interpretation of cultures*. New York: Basic Books Inc. Publishers.

Gitait, A. N., 2006. Learning through the computer among immigrant parents from Ethiopia as a way to nurture their children and reinforce the educational connection. *Gdish: Adult Education Annual*, 10, pp. 104-111. [Hebrew]

Golan, O. & Baron-Cohen, S., 2006. Systemizing empathy: teaching adult with Asperger Syndrome or high-function Autism to recognize complex emotions using interactive multimedia. *Development & Psychopathology*, 182, pp. 591-617.

Goldstein, A., Turnianski, B. and Blau, H., 2003. Students learning styles. *Al Hagova*, 2, 24-28. [Hebrew]

Goodlad, J., 1984. A place called school: Prospect of the future. NY: McGraw Hill.

Goodwyn, E., 2010. Approaching archetypes: reconsidering innateness. *Journal of Analytical Psychol*ogy, 55(4), 502-21.

Goshen, Y. & Zake, D., 2006. *Cognitive psychology*. The Open University of Israel: Unit 2, 3: Memory, Part 1, 2. [Hebrew].

Grasha, A. F. 1996. *Teaching with Style*. Pittsburgh, PA: Alliance Publishers.

Gregorc, A. F., 1979. Learning/teaching styles: Potent forces behind them. *Educational Leadership*, 36, 234-236.

Gregorc, A. F. 1982a. *An adult's guide to style*. Massachusetts 01754: Gabriel Systems Inc., Maynard.

Gregorc, A. F. 1982b. *Gregorc Style Delineator: Development, technical and administration manual.* Columbia, CT: Gregorc Associates Inc.

Gregorc, A. F., 2002. Frequently asked questions on style. Available at: www.gregorc.com/faq.html (accessed: 10.4.2011).

Gregorc, A. F. & Butler, K. A., 1984. Learning is a matter of style. *Vocational Education Journal* 59(3), 27-29.

Gropper, M., 2002. Computer integrated drug prevention: Combining multi-media and social group work practice to teach inner city Israeli 6th graders how to say no to drugs. *Journal of Technology in Human Services*, 211-2, pp.49-65

Guba, E. G. & Lincoln Y. S., 1981. *Effective evaluation*. San Francisco: Jossey Bass Inc., Publishers.

Guba, E. G. & Lincoln, Y. S., 1989. *Fourth generation evaluation*. Newbury Park, CA: Sage Publications.

Guba, E. G. & Lincoln, Y. S., 1998. Competing paradigms in qualitative research. In N. K. Denzin and Y. S. Lincoln, eds. *The landscape of qualitative research*. London: Sage Publications, pp. 195-220.

Guild, P. B. & Garger, S., 1985. *Marching to Different Drummers*. Jerusalem: The Branco Weiss Institute for Development of Thinking. [Hebrew]

Gullatz, S., 2010. Constructing the collective unconscious. *Journal of Analytic Psychol*ogy, 55(5), 691-714.

Haber, R. N., 1983. The impending demise of the icon: A critique of the concept of iconic storage in visual information processing. *Behavioral and Brain Sciences*, 6, pp.1-11.

Hake, R. R., 1998. Interactive-engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. *American Journal of Physics*, 66(1), 64-74.

Hamburger, Y., Fine, O. & Fine, A., 2007. The effects of need for cognition on internet use. *Computers in Human Behavior***,** 23(1), pp. 880-891.

Haramati, S., 2002. *Reading comprehension: A Guide for the teacher*. Kfar Monash, Israel: Offarim Publishing House

Harel. D., 1995. *Written in the mind, the theory of personalities and types of K. J. Jung and their expressions in handwriting.* Tel Aviv: The College of Management. [Hebrew]

Hativa, N., 1989. Computers in education, where did they come from and where are they going? *University of Tel Aviv, School of Education*, 36 2, pp. 31-39. [Hebrew]

Henik, A. & Rubinstein, O., 2007. *Science of cognitive neuroscience – Not a simple accounting.* Scientific American Israel site. Available at: http://www.hayadan.org.il/wp/discalculation-280407/ [accessed June, 2010]

Herrmann, N., 1990. *The creative brain*. Lake Lure, NC: Brain Book.

Hertz-Lazarovitz, R. & Fuchs, A., 1987. Collaborative Learning in the Classroom. Haifa: University of Haifa.

Hetzroni, O. & Eschanin, M., 2002. Emergent literacy in children with severe disabilities using interactive multimedia stories. *Journal of Developmental & Physical Disabilities* 142, pp. 173-190.

Heyman, G. D. & Gelman, S. A., 1998. Young children use motive information to make trait inferences. In H. Barkan, ed. *The effect of preschool children's social cognitive abilities on their peer sociometric status and behavioral evaluations*. Ramat-Gan: Bar-Ilan University.

Hillis, P. & Calderhead, D., 2009. Helping to keep history relevant: Multimedia and authentic learning. Available at: http://jime.open.ac.uk/2009/02/jime-2009-02.html (accessed: June, 2010).

Honey, P. & Mumford, A., 2000. *The learning styles helper's guide*. Maidenhead: Peter Honey Publications Ltd.

Howles, L., & Jeong, A., 2009. Learning styles and the design of e-learning: what the research says. Available at:http://www.uwstout.edu/ntlc/OnCampusOpportunities/upload/May62009e-Learning-Webinar-2.pdf (accessed: April, 2011)

Hu, P. J. H., Hui, W. Clark, T. H. K. & Tam. K. Y., 2007. Technology-assisted learning and learning style: A longitudinal field experiment. Systems, man and cybernetics, Part A. *IEEE Transactions on Professional Communication* 37 (6),1099 –1112.

Huberman, A. M. & Miles, B. M., 1994. Qualitative data analysis: An expanded sourcebook. 2nd ed. Thousand Oaks: Sage Publications.

Hultsch, D. F. & Dixon, R. A., 1990. Learning and memory in aging. In J. E. Birren & K. W. Schaie, eds., *Handbook of psychology of aging*, 3rd ed., New York Academic Press, pp. 259-273.

Hunt, D., 1986. *Beginning with ourselves: In practice, theory and human affairs*. Cambridge, Mass. 02238: Brookline Books.

Itin, C. M., 1999. Reasserting the philosophy of experiential education as a vehicle for change in the 21st century. *The Journal of Experiential Education*, 222, pp. 91-98.

Izikovitz, R., 2003. Gender and cultural assimilation among young immigrants from the former USSR. In Izikowitz, R. ed. *On and between cultural boundaries: Young immigrants in Israel.* Tel Aviv: Ramot, pp. 101-122. [Hebrew]

Jacobson, L., 2000. Valuing diversity-student-teacher relationships that enhance achievement. *Community College Review*28, pp. 49-66.

James, L. 2008. Matching teaching style with learning style. *Principal* 87(5), 62.

Johnson, D. W. & Johnson, F. P., 2005. *Joining together: Group theory and group skills.* Englewood Cliffs, NJ: Prentice Hall.

Jorgensen, D. L., 1989. *Participant observation: A methodology for human studies.* London: Sage.

Jovchelovitch, S., and Bauer, M. W. 2000.Narrative interviewing. In M. W. Bauer and G. Gaskall, eds..*Qualitative researching with text, image and sound*, pp. 57-74. London: Sage Publications.

Jung, C. G., 1921. *Psychological types*. Princeton, NJ: Princeton University Press.

Kaniel, S., 2001. *The psychology of control of cognition*. Ramat-Gan: Bar-Ilan University. [Hebrew].

Kashti, I., Manor, A., Yosifon, M. and Henik, M., 1989. Class management in middle school: Problems and meanings. In I. Danilov, ed. *Planning education policy.* Jerusalem: Ministry of Education and Culture.

Kayes, D. C., 2002. Experiential learning and its critics: Preserving the role of experience in management learning and education. *Academy of Management Learning and Education*, 12, pp. 137-149.

Kefach, A., 1997. Description of data in graphs – A cognitive aspect. *Talpiot Yearbook*, 170-179.

Keirsey, D., 1998. *Please understand me II: Temperament, character, intelligence.* Del Mar, CA: Prometheus Nemesis Book Company.

Kill, Y., 1997. *Religious Education Administration (HEMED) – History, roots and problem*. Jerusalem: The Ministry of Education together with the Department of Religious Studies. [Hebrew].

Kluwe, R. H., 1982. Cognitive knowledge and executive control: Metacognition. In: D. R. Griffin, ed., *Animal-mind human-mind*. New York: Springer-Verlag, pp. 201-224

Kolb, D.A.,1971. *Individual learning styles and the learning process*. Working Paper #535-71, MA: Sloan School of Management, Massachusetts Institute of Technology.

Kolb, D. A., 1983. *Experiential learning: Experience as the source of learning and development.* New Jersey: Prentice Hall.

Kolb, D. A., 1984. *Experiential learning: Experience as the source of learning and development*. New Jersey: Prentice Hall.

Kolb, D. A., 1985. *Learning style inventory*. Boston, MA: McBer and Company.

Kolb, D. A., 1999. *Learning Style Inventory, Version 3*. Boston, MA: Hay Group, Hay Resources Direct. 116 Huntington Avenue, Boston, MA 02116, haytrg@haygroup.com.

Kolb, D. A. & Kolb, A., 2005. *The Kolb Learning Style Inventory—Version 3.1 technical specifications.* Available at:

http://www.learningfromexperience.com/images/uploads/Tech_spec_LSI.pdf(accessed 10.10.2010).

Koriat, A., 2003. 'To know that I know. *Igeret*, 24, pp. 9-12. The Israel Academy of Sciences and Humanities. [Hebrew]

Koriat, A., Goldsmith M. & Pansky, A., 2000. Toward a psychology of memory accuracy. *Annual Review of Psychology*, 51, pp. 481-537.

Koriat, A., Goldsmith, M. Schneider, W. & Nakash-Dura, M., 2001. The credibility of children's testimony: Can children control the accuracy of their memory reports? *Journal of Experimental Child Psychology*, 79, pp. 405-437.

Kozminsky, L. 2004. Talking for themselves: Self-Advocacy of learning disabilities. Tel Aviv: Yesod Institute. [Hebrew]

Kramarski, B. & Weiss, I., 2007. Investigating preschoolers' mathematical engagement in a multimedia collaborative environment. *Journal of Cognitive Education and Psychology* JCEP 63, pp. 411-432.

Kromholtz, N. & Hass-Markoza, O., 1997. Self-learning, multimedia and the role of the teacher – Media environment plus. In: A. Peled, ed., *Education in the Test of Time.* Tel Aviv: Ramot, pp. 328-340.

Ku, D. & Shen, C. 2009. Reliability, validity, and investigation of the index of learning styles in a Chinese language version for late adolescents of Taiwanese. *Adolescence*, 44(176), 827-850.

Kuhn, T. S., 1962. *The structure of scientific revolution*. Chicago: Chicago University Press.

Lampert, M., 1990. When the problem is not the question and the solution is not the answer: Mathematical knowing and teaching. *American Educational Research Journal*, 271, pp. 29-64.

Lant, T. & Shapira, Z., 2000. *Organizational cognition: Computation and interpretation.* Mahwah, NJ: Lawrence Erlbaum.

Lapuh Bele, J. & Rugelj, J., 2009. Comparing efficiency of web based learning contents on different media. *International Journal of Emerging Technologies in Learning* iJET, 4.

Lavi, V. & Shild, A., 2003. *Report of the committee for equal opportunity, Registration zone or region choice in Jerusalem*. Available at: http://www.jerusalem.muni.il/pages/vaada_takzir.pdf (Accessed: 14 June, 2008). [Hebrew]

Lawrence, G., 1994. *People types and tiger stripes*. 3rd ed. Gainesville, FL: Centre for Applications of Psychological Type.

Leite, W. L., Svinicki, M. & Shi, Y. (2010). Attempted validation of the scores of the VARK: Learning Styles Inventory with multitrait-multimethod confirmatory factor analysis models. *Educational and Psychological Measurement*. 70, 323-339.

Levi, Z., 1998. The connection between pupils' personal characteristics and the characteristics of the multimedia presentations that they construct. University of Tel Aviv, School of Education, p. 93

Levin, H., 1987. Accelerated schools for disadvantaged students. *Educational Leadership,* 44(6), pp.19-21.

Lewin, K., 1951. *Field theory in social science*: *Selected theoretical papers*. New York: Harper.

Lichtinger, O., 2010. Influence of a learning environment on pupils' self-regulation processes and motivation. *Oranim Matters,* 3, 135-147.

Lowe, R. K. (2003). Animation and learning: Selective processing of information.in dynamic graphics. *Learning and Instruction*, 13, 157-176.

Liberman, A., 2001. Effects of Multilevel Versus Unilevel Metacognitive Training on Mathematical Reasoning. *Journal of Educational Research*, 94(5), pp. 292-300.

Lieblich, A., Tuval-Mashiach, R. and Zilber, T. 1998.*Narrative research*. London: Sage Publications.

Lieblich, A. ed. (1998) .*The Narrative Study of Lives*. pp. 59-97. London: Sage Publications

Lincoln, Y. & Guba, E., 1985. *Naturalistic inquiry*. New York, Sage.

Lincoln, Y. S. & Guba, E. G., 2000. Paradigmatic controversies, contradictions, and emerging confluences. In N. K. Denzin and S. L. Lincoln, eds. *Handbook of qualitative research*. London, Sage Publishers: 163-188.

Lujan, H. L. & DiCarlo, S. E., 2006. Too much teaching, not enough learning: what is the solution? *Advanced Physiological Educ*a*tion*, 30, 17-32.

Maanen, M. V., 1990. *Researching lived experience: Human science for an action sensitive pedagogy*. Albany, NY: State University of New York Press.

Maehr, M. L. 1984. Meaning and motivation: Towards a theory of personal investment. In C. Ames and E. Ames, eds. *Research on motivation in education.* 1, pp. 115-144.

Maehr, M. L. & Midgley, C. 1996. *Transforming school culture*. Boulder, CO: Westview Press.

Maykut, P. & Morehouse, R., 1994. *Beginning qualitative research: A philosophical and practical guide*. London: The Falmer Press.

McCarthy, B., 1990. Using the 4MAT System to bring learning styles to schools. *Educational Leadership*, 48(2), 31–37.

McCarthy, B., 1980. *The 4MAT System: Teaching to learning styles with right/left mode techniques*. 200 West Station Street, Barrington, IL: Excel, Inc.

McCarthy, B., 1997. A tale of four learners: 4MAT's learning styles *Educational Leadership*, 54(6), 46-51.

McCaulley, M. H., 1981. *Jung's theory of psychological types and the Myers-Briggs Type indicator*. San Francisco: Jossey Bass.

McClusky de Swart, S. 2010. *Learning fellows seminars: A case study of a faculty development program using experiential learning theory to improve college teaching.* PhD. dissertation. Department of Education, Case Western Reserve University. Available at: http://etd.ohiolink.edu/view.cgi?acc_num=case1259957028 [accessed: February, 2010]

McNiff, J., 1994. Conversations with action researchers. *Action Researcher,* 1, (Spring), 18- 19.

Mevarech, Z., 1994. Learning towards mastery: How can achievements be increased and difference reduced in the classroom? In I. Rich & R. Ben-Ari, eds. *Teaching methods for a heterogeneous class.* Israel: Reches Educational Projects Ltd. [Hebrew]

Merriam, S. B. & Simpson, E. L., 1984. *A guide to research for educators and trainers of adults.* Malabar, FL: Robert E. Krieger Publishing Company.

Miles, B. M. & Huberman, A. M., 1984. Drawing valid meaning from qualitative data: toward a shared craft. *Educational Researcher* 13(5), pp. 20-30.

Miles, M and Huberman, M. A. 1994.*Qualitative data analysis*. Beverly Hills: Sage Publication.

Miller, G. A., 1956. The magical number seven, plus or minus two: Some limits on our capacity for processing information. *Psychological Review*, 63, pp. 81-97.

Miller, P.,2001. *Learning Styles: The Multimedia of the Mind.* Research Report on February 1, 2011 from ERIC database. (ED 451 140)

Minkowitz, A., Davis, D. & Bashi, I., 1980. *Primary school achievements in education in Israel.* Jerusalem: Magnes.

Ministry of Education, 2011. *Learning programme – Adaptation of the education system to the 21st century and the new technologies*. Available at Science and Technology Aministration site, State of Israel, Ministry of Education: http://cms.education.gov.il/EducationCMS/Units/MadaTech/hatamat_marechet_21/ (accessed 22.3.2011).

Montessori, M., 1967. *The discovery of the child*. NY: Ballantine Books,

Montessori, M., 1995. *The absorbent mind*. NY: Henry Holt and Co

Motero, M. & Shternlicht, A., 2003. Integration of multimedia in the processing and understanding of phenomena and principles in the world of nature – Children create in a hypermedia environment under the guidance of students. *Bemiklala*, 15, pp. 279-294. [Hebrew]

Myers, I. B., 1962. *Manual: The Myers-Briggs Type Indicator*. Consulting Psychologists Press, Palo Alto, CA.

Myers, I. B. & McCaulley, M. H., 1985. *Manual: A guide to the development and use of the Myers-Briggs Type Indicator*. Consulting Psychologists Press, Palo Alto, CA.

Myers, I. B., & Myers, P. B. 1995. *Gifts Differing*: *Understanding Personality Type*. Mountain View, CA: Davies-Black Publishing,

Nadler, A., 2000. *Social psychology*. Tel-Aviv: Open University of Israel, Unit 2 [Hebrew].

Naimie, Z. and Siraj, S. and Piaw, C. Y. and Shagholi, R. and Abuzaid, R. A. (2010). Do you think your match is made in heaven? Teaching styles/learning styles match and mismatch revisited. *Procedia - Social and Behavioral Sciences*, 2, 349-353.

Nastasi, B. K. & Clements, D. H., 1991. Research on cooperative learning: Implication for practice. *School Psychology Review***,** 20, pp. 110-131.

Navon, D., 2001. The mirror of cognitive psychology. *Igeret*, 21, 7-9. The Israel Academy of Sciences and Humanities. [Hebrew].

Neuroscience, Cognition and Education Institute. 2007. An interdisciplinary thinktank under the supervision of the Chief Scientist of the Israel Ministry of Education. Available at: http://campus.achva.ac.il/nsce/default.aspx [accessed 4.2011].

Oblinger, D., 2004. The next generation of educational engagement. *Journal of Interactive Media in Education*, 8.

Ofir, L. & Globman, R., 1994. Learning and Story understanding between preschool children. *Helkat Lashon*, 15-16, pp. 116-145. [Hebrew].

O'Nell, J., (1990). Making Sense of Style. *Educational Leadership*, 48, 2.

Oshrat, Y. & Vidislavski, M., 2007. *A platform for the management of professional development in a primary school. [*Hebrew] Available at:http://cms.education.gov.il/NR/rdonlyres/FD36B0FC-D84B-492A-95F1-1370C0FE3C54/112135/5bamalenihulhahitpathut.pdf (accessed: 27th June, 2010).

Osman, M. E. & Hannafi M. J., 1992. Metacognition research and theory: Analysis and implications for instructional design. *Educational Technology*, *Research and Discussion*, 40, pp. 83-99.

Ozpolat, E.& Akar, G. B., 2009. Automatic detection of learning styles for an e-learning system, *Computers & Education*, 53(2), 355-367.

Panella, J. J., Lilliston, B. A., Brush, D. & McDowell, F. H., 1984. Day care for dementia patients: An analysis of a four-year program. *Journal of the American Geriatrics Society,* 32(12), pp. 883-886.

Patton, M. Q., 1980. *Qualitative evaluation methods*. Beverley Hills: Sage Publications.

Passig, F. C., 2003. 'Melioration' as higher order thinking skills of a future intelligence. *Practice in Learning Planning,* 18(1) 31-52. [Hebrew]

Patton, M. Q., 1990. *Qualitative evaluation and research methods*. Thousand Oaks, CA: Sage.

Piaget, J. 1964. Development and learning*. Journal of Research in Science Teaching*, 2, pp. 176-186.

Pidgeon, N. & Henwood, K., 1996. Grounded theory: Practical Implementation. In J. T. R. Richardson, ed. *Handbook of qualitative research methods*. Leicester, The British Psychological Society Books, 86-101.

Pintrich, P. R. & Schunk, D. H., 1996. *Motivation in education: Theory, research, and applications*. Englewood Cliffs, NJ: Prentice Hall.

Pitta-Pantazi, D., & Christou, C., 2009. Cognitive styles, dynamic geometry and measurement performance. *Educational Studies in Mathematics*, 70(1), 5-26.

Platsidou, M. & Metallidou, P. (2009).validity and reliability issues of two learning style inventories in a Greek sample: Kolb's Learning Style Inventory and Felder & Soloman's Index of Learning Styles. *International Journal of Teaching and Learning in Higher Education*, 20(3), 324-335.

Polanyi, M., 1967. *The tacit dimension*. Chicago: The University of Chicago Press.

Reeve, J., 2006. Teachers as facilitators: What autonomy-supportive teachers do and why their students benefit. *The Elementary School Journal*, 10(63), pp. 225-236.

Reisman, F., 1966. Styles of learning. *NEA Journal,* 55. 15-17.

Rich, I., 1996. *The heterogenic class. Studies in economy and society.* Ramat Gan: Bar Ilan University Publications. [Hebrew]

Rich, I. & Ben Ari, R., 1994. *Teaching methods for a heterogenic class*. Even Yehuda: Reches Publishers Educational Projects Ltd. [Hebrew]

Richardson, J., 1984. *Working with people.* San Francisco, CA: Associate Management Institute.

Riding R., & Rayner S., 1998. *Cognitive styles and learning strategies: Understanding style differences in learning and behaviour.* London: David Fulton.

Ring, B. P., 1998. *Introduction to personality type and personality*. Available at:http://personalityinstitute.tripod.com/TypeTerminology.htm.(accessed 10.4.2011).

Rist, R. L., 1982. On the application of ethnographic inquiry to education: Procedures and possibilities. *Journal of Research in Science Teaching*, 19(6), pp. 439-450.

Roberge, G. D., Gagnon, L. L. & Oddson, B. E., 2011. The ideal classroom: A comparative study of education and nursing student learning and psychosocial environmental preferences. *Institute for Learning Styles Journal*, Volume 1 page 1-16.

Rogers, K. M. L. (2009) A preliminary investigation and analysis of student learning style preferences in further and higher education. *Journal of Further and Higher Education*, 33 (1), 13-21.

Rose, D. H., 2008. *No child left out: Making school work for everyone*. Available at: http://www.uknow.gse.harvard.edu/learning/LD316.html[accessed: 2/2011]

Rose, D. H., & Meyer, A., 2006. *A practical reader in Universal Design for Learning*. Cambridge, MA: Harvard Education Press.

Rosenfeld, M., 1994. *Theories and one practical model*. Accessible on line at:http://construct.haifa.ac.il/~hanochk/situations/lessons/learning_cycle/learning.pdf (accessed: July 2009). [Hebrew]

Rosenfeld, S. and Rosenfeld, M., 2004. Developing teacher sensitivity to individual learning differences. *Educational Psychology*, 24(4), 465-486

Rosenthal, G. (1993). Reconstruction of life stories: Principles of selection in generating stories for narrative biographical interviews. In R. Josselson & A. Lieblich (Eds.), *The narrative study of lives* (pp. 59-91). Newbury Park, CA: Sage.

Rosenthal, R. & Jacobson L., 1968. *Pygmalion in the classroom: Teacher expectations and pupils' intellectual development*. New York: Holt, Reinhart and Winston.

Rundle, S. 2009. Professor Rita Dunn - 1929-2009. Available at: http://www.cubion.dk/files/nyheder/RITA.pdf[accessed in 2009]

Ryan, Gery W., &Bernard, H. Russell 2000.Data management and analysis methods. In Norman K. Denzin and Yvonna S. Lincoln eds., *Handbook of qualitative research* pp.769-802. Thousand Oaks: Sage.

Ryan, R. M. & Deci E. L., 2000a. Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, 25: 54 67.

Ryan, R. M. & Deci, E. L., 2000b. Self-determination theory and the theory and the facilitation of intrinsic motivation, social development, and wellbeing. *American Psychologist*, 55(1), pp. 68-78.

Sabar Ben-Yehoshua, N., 199*0. Qualitative Research in Teaching and Learning*. Tel Aviv: Modan [Hebrew]

Sabar, N., 2001. *Genres and traditions in qualitative research*. Tel Aviv: Dvir.

Salomon, G., 1997. Innovative constructivist learning environments: Issues for Study. *Education for Thinking*, 11, pp. 27-35. Also available at: http://ceti.macam.ac.il/Courses/ma2/art_4.html Accessed: May 2010. [Hebrew]

Salomon, G. & Ben-Zvi, D., 2006. The difficult marriage between education and technology: Is the marriage doomed? In L. Verschaffel, F. Dochy, M. Boekaerts and S. Vosniadou, eds. *Instructional psychology: Past, present and future trends*, *fifteen essays in honour of Erik De Corte*. Advances in Learning and Instruction Series, Elsevier, pp. 209-222.

Salomon, G. & Perkins, D., 1996. Learning in wonderland: What do computers really offer education? In S.T. Kerr, ed. *Technology and the future of education*, *NSSE Yearbook*. Chicago: University of Chicago Press, pp.111-130.

Sauli, P., 2006. *The Ministry of Education activity in road safety issues.* Israel Ministry of Education, Spokesman's Office. Available at: http://cms.education.gov.il/EducationCMS/Units/Dovrut/Bitachon/zehirutbadrahim.htm [accessed: 14th June 2008].

Scaife, M. & Rogers, Y. (1996). External Cognition: How do graphical representations work? *International Journal of Human-Computer Studies,* 45,185-213.

Schraw, G. & Moshman D., 1995. Metacognitive theories. *Educational Psychology Review*, 7, pp. 351-371.

Sciarra, D. T., 1999. The role of the qualitative researcher. *Using qualitative methods in psychology*. M. Kopala and L. Suzuki. Newbury Park, CA, Sage: 37-48.

Seidel, J. & Kelle, U. 1995 Different functions of coding in the analysis of textual data. In U. Kelle, ed. *Computer-aided qualitative data analysis: Theory, methods and practice.* London: Sage, pp. 52-61.

Seidman, I. E. (1991).*Interviewing as qualitative research: A guide for researchers in education and the social sciences*. New York: Teachers College Press.

Shani, N. & Nahmias, R., 2001. *Virtual Course – For whom? Studies in Technology and Sciences,* 34, 26-29. [Hebrew]

Sharan, S., Shahar, H. & Levine, H., 1998. *An innovative school, organization and teaching.* Tel Aviv: University of Tel Aviv - Ramot.

Sharon, D., 2004. A suggestion for changing teaching methods in post-primary education. In I. Kopp, ed. *Allocating Resources to Social Services*. Jerusalem: The Taub Centre for the Study of Social Policy in Israel, pp. 287-299 [Hebrew].

Sharoni-Yitzhak, V. 1990. *Issues in special education, Learning disabilities.* Tel-Aviv: Open University Publication. [Hebrew].

Schunk, D. H., 1991. Self-efficacy and academic motivation. *Educational Psychologist*, 26, pp. 207-231.

Schunk, D. H., 1995. Self-efficacy and education and instruction. In J. E. Maddux, ed. *Self-efficacy, adaptation, and adjustment: Theory, research, and application*. New York: Plenum Press, pp. 281-303.

Schunk, D. H. & Pajares F., 2002. The development of academic self-efficacy. In A. Wigfield and J. Eccles (Eds.). *Development of achievement motivation.* San Diego: Academic Press. pp. 16-31.

Shedmi, H., 2007. Standard for developing, conducting and assessing the cultural climate in school. Jerusalem: The Ministry of Education and the Department of Religion. Also available on-line at: http://storage.cet.ac.il/CetForums/Storage/MessageFiles/6766/27276/Forum27276M214490I0.doc [Hebrew]

Shkedi, A., 2003. *Words of meaning: Qualitative research - Theory and practice.* Tel Aviv: Ramot-Tel Aviv University Press. [Hebrew]

Shlasky, S. & Alpert, B., 2007. *Ways of writing qualitative research*. Tel Aviv: Mofet Institute.

Shleifer, M., Levine, R., Shilton, H., Freuner, T. & Levine, A., 2006. Omnipotent Nachshon: A combined learning programme to foster linguistic literacy learners in a structured sequence from nursery to school. *Hed Hagan*, 70 3, pp. 20-31.

Shoshani, S., 2004. *The education system in Israel, 2004: Suggestion for improving and advancing the system*. Herzliya, Interdisciplinary Centre [Hebrew].

Shulman, L. S., 1981. Disciplines in education: An overview. *EducationalResearcher* 10(6), pp. 5-12.

Shuster-Bouskila, G. & Rabbe, L., 2001. *Embracing learner styles in the EFL curriculum*. http://www.oocities.org/gailshb/msq.html (accessed 4/4/2011) [Hebrew]

Shvarzfeld, Y., 1999. *The parents and teachers attitude about primary school – Expectation and demands.* Jerusalem: The Ministry of Education and the Department of Religion. [Hebrew].

Silver, H. & Strong, R. & Perini M., 1997. Integration learning styles and multiple intelligences. *Educational Leadership* 55(1). 22-27.

Sims, R. & Sims, S. eds., 2006. *Learning styles and learning: A key to meeting the accountability demands in education*. Hauppauge, NY: Nova Publishers.

Sizer, T., 1984. *Horace's compromise. The dilemma of the American high school*. Boston: Houghton Mifflin Company.

Sizer, T. R., 1992. *Horace's school: Redesigning the American high school*. Boston: Houghton-Mifflin.

Smith, R. W., 1975. *Strategies of social research: The methodological imagination.* London: Prentice Hall.

Spradley, J., 1979. *The ethnographic interview.* New York: Holt, Rinehart and Winston.

Stake, R. E., 1994. Case studies. In N. K. Denzin and Y. S. Lincoln, eds. *Handbook of qualitative research*. Thousand Oaks, CA: Sage, pp. 236-247.

Stake, R. E., 1995. *The art of case study research*. London, Thousand Oaks, CA: Sage.

Stake, R. E., 2000. Case studies. In N. K. Denzin & Y. S. Lincoln, eds., *Handbook of qualitative research.* 2nd ed. Thousand Oaks, CA: Sage Publications, Inc., pp. 435-454.

Steffe, L. P. & Gale, J., 1995. *Constructivism in education*. Hillsdale, NJ: Lawrence Erlbaum.

Sternberg, R., 1990. *Metaphors of mind: Conceptions of the nature of intelligence.* Cambridge: Cambridge University Press.

Stirling, P., 1987. Power lines. *NZ Listener*, June 20, 13-15.

Storr, A., 1998. *Jung*. Tel Aviv: Dvir with Zmora Bitan. [Hebrew]

Strauss, A. L., 1987. *Qualitative analysis for social scientists*. New York: Cambridge University Press.

Strauss, A. L. & Corbin, J., 1990.*Basics of qualitative research: Grounded theory procedures and techniques*. Newbury Park, CA: Sage.

Strong H.F. & Silver, R.W. 2006. *The Thoughtful Classroom: Participant Workbook*. Ho-Ho-Kus, NJ: Thoughtful Education Press, LLC.

Sun, K., Lin, Y. & Yu. C., 2008. A study on learning effect among different learning styles in a Web-based lab of science for elementary school students. *Computers and Education* 50(4), 1411–1422.

Talis, S., 2002. *Teaching mathematics according to an individual as opposed to collaborative strategy with educational multimedia software and its influence on achievements and attitudes in early childhood*. M.A. dissertation. University of Bar Ilan, Ramat Gan, Israel.

Tanner K. & Allen D., 2004. Approaches to biology teaching and learning: Learning styles and the problem of instructional selection-engaging all pupils in science courses. *Cell Biolology Education* 3(4), 197–201, Available at: http://www.lifescied.org/cgi/content/full/3/4/197[access 2/2011]

Tanner K. & Allen D., 2004. Approaches to biology teaching and learning: Learning styles and the problem of instructional selection-engaging all pupils in science courses. *Cell Biolology Education* 3(4), 197–201, Available at: http://www.lifescied.org/cgi/content/full/3/4/197 [accessed 2.2011]

Tawei, K. D. & Shen, C., 2009. Reliability, validity, and investigation of the index of learning styles in a Chinese language version for late adolescents of Taiwanese. *Adolescence*, 44(176), pp. 827-850.

Tendy, S. M., & Geiser, W. F., 1998/9. The search for style: it all depends on where you look. *National Forum of Teacher Education Journal*, 9(1), 3–15.

Tero, P. & Connell, J. P., 1984. *Children's academic coping inventory: A new self-report measure*. Paper presented at American Educational Research Association, Montreal.

Tobias, S. & Duffy T. M., 2009. *Constructivist instruction: Success or failure?* NY: Routledge.

Tversky, B., Morrison, J. B. & Betrancourt, M., 2002. Animation: Can it facilitate? *International Journal of Human-Computer Studies*, 574, pp.247-262.

Tyler, L. E., 1965. *The psychology of human differences*. 3rd ed. New York: Appleton-Century-Crofts/Prentice-Hall.

Vadmani, R., 1994. *Teacher thinking in a computer and technology multimedia integrated educational environment*. M.A. dissertation. University of Tel Aviv, School of Education.

Vansteenkiste, M., Zhou, M., Lens, W. & Seonens, B. 2005. Experiences of autonomy and control among Chinese learners: Vitalizing or immobilizing. *Journal of Educational Psychology*, 97(3), pp. 468-483.

Van Zwanenberg, N, Wilkonson, L. J., and Anderson, A. (2000). Felder and s Index of Learning Styles and Honey and Mumford's Learning Styles Questionnaire: How do they compare and do they predict academic performance? *Educational Psychology*, 20 (3): 365-380.

Vermunt, J. D., 1994. *Inventory of Learning Styles (ILS) in higher education*. Tilburg ,Germany: University of Tilburg.

Vermunt, J. D., 1996. Metacognitive, cognitive and affective aspects of learning styles and strategies: A phenomenographic analysis. *Higher Education*, 311, 25-50.

Vermunt, J. D., 1998. The regulation of constructive learning processes. *British Journal of Educational Psychology*, 682, 149-171.

Vigotsky, L. S., 1978. *Mind in society: The development of higher psychological processes.* Cambridge MA: Harvard University Press.

Von Glasersfeld, E., 1995a. Piaget's constructivist theory of knowledge. In: Steffe, L. P. & Gale, J., eds. *Radical constructivism*. London: The Palmer Press, pp. 53-75.

Von Glasersfeld, E. 1995b. *Radical constructivism: A way of knowing and learning.* NY: The Falmer Press.

Wang, K. H., Wang, T. H. Wang, W. L. & Huang. S. C., 2006. Learning styles and formative assessment strategy: Enhancing student achievement in Web-based learning. *Journal of Computer Assisted Learning* 22 (3), 207–217.

Wehrwein, E. A. & Lujan, H. L. DiCarlo, S. E., 2007. Gender differences in learning style preferences among undergraduate physiology pupils. *Advanced Physiological Educ*a*tion,* 31,153–157.

Willingham, D. T., 2010.*Why don't pupils like school: A cognitive scientist answers questions about how the mind works and what it means for the classroom*. San Francisco: Jossey-Bass.

Wilson, C., 2010. Tools of the trade. *Training Journal.* 65-67.

Wilson, V. A., 1998. Learning how they learn: A review of the literature on learning styles. New Concord, OH: Muskingum College. ERIC Document Reproduction Service No.ED 427017.

Wintergerst, A. C., DeCapua, A. & Verna M., 2003. Conceptualizing learning style modalities for ESL/EFL students. *System,* 3(1), 85-106.

Witkin, H. A., 1962. *Psychological differentiation: Studies of development*. New York: Wiley.

Yahalom, I., 1997. The learning environment in the teleprocessing space: The user's viewpoint. Chapter B – the teleprocessing cybernetic space. *Computers in Education*, 42, pp. 15-21. [Hebrew]

Yariv, E., 2010. *I've got eyes in the back of my head*. Even Yehuda: Reches Publishers.

Yin, R. K., 1989. *Case study research--design and methods*. Thousand Oaks, CA: Sage.

Zakai, D., 2003. *Cognitive Psychology. 3 – Perception*. Open University Publication. in Hebrew.

APPENDIX 2.1

Teaching Methods

Introduction

Sociological, psychological and philosophical approaches have changed rapidly in recent decades engendering a universal desire to change the education system to meet these changes (Chen 2006, Sharan et al., 1998).

Contemporary criticism of the education system by both scholastic bodies and the public regarding the effectiveness of schools motivates teachers and educators to seek new and alternative teaching and learning methods.

The present-day educational system in Israel is a bureaucratic hierarchic organisation whose policy is dictated from above, providing a clear distribution according to roles and specialisations, a behaviour code for the organisation's employees, performance supervision or control, impersonal relations towards the work and the employees, and training for professional qualifications (Sharan et al., 1998).

These characteristics were determined at the end of the 18th century in order to meet the needs of industrial organisations. The concept that the learners would eventually be employed by industrial organisations influenced the organisation of the education system and its teaching methods so that the structure of the education system and consideration of the learners resembled the structure of industrial organisations and their consideration of employees (Sharan et al., 1998).

At the beginning of the 20th century, cracks began to appearin the bureaucratic structure of the school. Policy-makers aspired to attain wider social objectives due to demographic changes in the Western world leading to the abandonment of policy calling for equality and excellence in favour of a new approach that saw the school as the place where pupils would imbibe powerful social and personal values in school that would guide them throughout their lives. Principles that could be taught in school might include: each person has his or her good and bad sides and each person has the right to respect and fairness.

This would mean that, despite the differences among pupils, they would be able to play and work together without undue influence of factors such as their social class, ethnic belonging, place of domicile, social situation, sex or religious affiliation (Rich, 1996).

These principles are particularly relevant in classrooms in Israel, which is an immigrant country, where pupils differ in body build, language, customs and norms, stemming from different national and ethnic cultures. Some immigrant families feel comfortable in their new surroundings, whilst others feel estranged and alienated, and their pupils react accordingly in their day-to-day school lives. Class, may also be socio-economically heterogeneous, so that pupils from affluent families learn alongside pupils from families that work hard to eke out a living and pupils who live in abject poverty. The complex nature of such classes poses a serious challenge to teachers who have turned to policy makers to find more flexible teaching methods and to try to meet the varied requirements of the pupils.

These heterogeneous classes, where there is a clash between the principles of equality: education for all and the demand for excellence: challenging specific groups, necessitate adaptation of class management skills and learning programmes.

When the social aspect is added to the equation this makes the teacher's job extremely complicated, not to mention the fact that it is hard to clearly define what a heterogeneous class is (Rich 1996, Rich, Ben Ari, 1994). Heterogeneity can relate to differences in social status or academic or other abilities or cultural differences stemming from the pupils' country of origin. Whatever the nature of the heterogeneity, it is clear that the teaching method must consider differences in the pupils' abilities.

A survey published by Chen (2006) assessed the teaching methods practised in recent decades. The survey looked first at John Dewey's approach, implemented in his experimental school founded in 1896, which espoused principles such as 'learning by doing', 'the essential point', education towards democracy', 'integrated learning' (Dewey, 1916). The survey then reviewed Maria Montessori's scientific approach (Montessori, 1967, 1995) and concluded

with an examination of the experimental school approach which changed both content and organisation in Israeli schools (Chen, 2006).

Dewey's concepts (Dewey, 1916) served as inspiration for innovative 'scientific humanist' methods (Goodlad, 1984, Levin, 1987, Sizer, 1992) developed at Tel Aviv University (Chen, 2006). Goodlad and Sizer examined the existing school system, considering what needed to be changed and identified components that would contribute to successful change, focusing on a new effective model for the existing reality.

In this context, Hank Levin's work is of particular interest (Levin, 1987). Instead of remedial instruction which aims at improving weak pupils' achievements in all subjects, he suggests that pupils' personal abilities of and potential for success should be assessed individually and a suitable individual teaching plan should be constructed for each one.

Chen (2006) showed that previous endeavours to change the appearance of education have included the following features:

1. Emphasis on structural, organisational and administrative aspects.
2. Definition of the objectives for the change determined by public committees.
3. Top-down approach to change.
4. Change dependent on legislation and administrative decisions.
5. Heavy public expenditure involved in performing the change.

Any innovative strategy taught in heterogeneous classes begins with the understanding that change is necessary. The next stage is to learn how to implement the innovative system through practice, aiming to adopt the alternative teaching methods.

The next section discusses the prominent teaching methods that have been developed and attempted and their theoretical rationales.

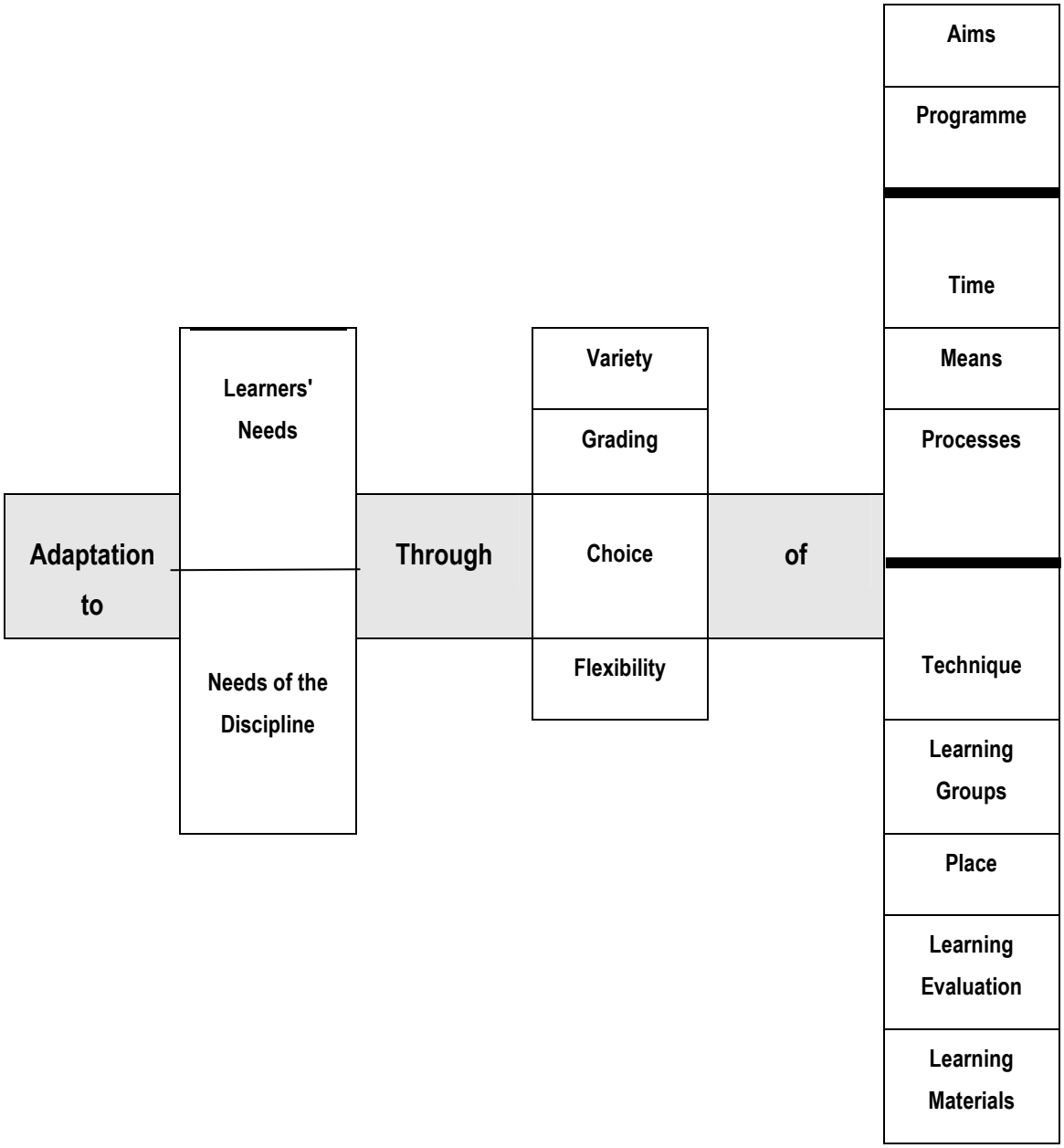
'Adaptive Teaching' in a Heterogeneous Class

'Adaptive Teaching' began with the search for an educational alternative that could help each pupil to improve their educational achievements from the point which that pupil had reached so far. The motivation for this method was the need to help pupils from various different socio-economic backgrounds to be able to cope within the demands of the 21st century, where the individual is required to continue with independent life-long learning in order to understand and adapt to a modern technological society. This is especially obvious in Israel where immigrants from less technologically advanced societies, for example Ethiopia are required to assimilate within classes with pupils well-versed in modern technology.

Although the new method emphasised the differences between the pupils, teaching was adapted in order to educate the pupil according to the pupil's level of understanding, and chosen method and style of learning. This method has ancient roots in Chinese culture and scriptures from the first century A.D. (Brinker at el., 1994).

The paedocentric tendency that focussed on the pupil's education and made it the main goal of educational work gained momentum in the 20th century assisting the development of the Adaptive Teaching approach. The Adaptive Teaching system was also influenced by humanistic, developmental and cognitive psychology, which relate to the individual's personality and the reciprocal interaction of the individual with their surroundings, recognising individual differences and considering learning and thinking process. See Figure A1 below for a graphic scheme of Adaptive Teaching.

Figure A1: Adapting Teaching for different Pupils



Although any adaptation must conform to the Israeli Ministry of Education's curriculum there is room for flexibility to meet the school's aims and particular needs.

The learning environment should be enriched, and the activities graded to adapt them to the needs of individuals, groups or for the entire school community. Teaching and learning takes place in several locations in the school, such as the computer room, the library, the science lab and the main classroom. Time planning refers to the teacher's teaching time and the pupil's learning time and includes teacher-pupil/pupils meetings, as well as the teachers' and pupils' independent work time. Skills needed for planning, task grading and time management are learned through experience, and teachers are given additional support through training courses and mentoring.

Active learning

The Active Learning approach provides solution for difficulties arising from heterogeneity in a class. The assumptions of Active Learning are that each pupil has his or her own internal motivation for learning based on his or her natural curiosity and pupils are therefore able to make significant independent decisions about learning(Hake 1998).

The pupils in the classroom are regarded as separate individuals in terms of their fields of interest, their needs, their motivation and their learning requirements.

- The learning process – Emphasises the importance of personal choice, personal pace and personal style, to promote learning. Learning is carried out through independent experimentation, so that the pupils cope with mistakes and even with frustration through trial and error, games and project work on topics that interest them.
- Knowledge – the contribution of the individual's personal perceptions and experience is recognized as a means to develop thinking processes, and learning about emotions and social relations.
- The learning environment Should preferably be rich in materials that stimulate curiosity and inquiry, an environment not limited to the four walls of the classroom, a real life environment that provides many launching points for learning for all age ranges.

- Learning for Mastery – This approach gives precedence to improvement of the class's achievement level and attempts to minimise differences between pupils.

  The Learning for Mastery approach attempts to dispel the myth regarding the connection between a disadvantageous environment and performance failure and to prove that achievement is a function of the relation between the time required by a pupil and the time allocated for learning. In the traditional system equal time is allocated for each class for a particular unit of learning, although it is well known that different populations (according to social, intellectual and skill levels) need different amounts of time to learn a particular unit (Carroll, 1963).

  The Learning for Mastery system therefore suggests implementing feedback and correction procedures which work as follows: the teacher tutors a short learning unit for a week or two. At the end of that period, the pupils take a formative test and each gets specific feedback. Those who have not achieved a good command of the subject at hand return to the same unit and correct their mistakes. Those who have mastered the unit help their friends and/or are given enrichment material while the pupils who are 'correcting' take the test again. This continues for several learning units. All the pupils take a summative test for the unit of learning.

  First of all, the teacher prepares criteria that will indicate that mastery has been achieved based on the learning objective and an evaluation of the pupils, after which the teacher prepares the formative tests. In the second phase, the teaching phase, the subject matter is introduced to the pupils through the teacher's choice of didactic means.

  At the feedback and correction stage, each pupil receives feedback as soon as possible after a test so that the pupil knows what he has mastered and what needs to be improved before the next test. The advantage of this system is that teachers do not need to drastically change their work methods; they merely need to divide the subject matter into small units and compose a series of formative tests. The

formula of setting a goal, testing, teaching, and feedback and correction engenders improvement in performances without creating resistance or excessive upheaval.

The system enables high level of cognitive activities because the improvement in the pupils' basic knowledge allowing them to reach a high complex thinking level.

Co-operative learning towards learner control

This method evolved from Learning for Mastery and it facilitates the improvement of high-level and low-level cognitive processes (Mevarech, 1994) Co-operative Learning is assumed to have the potential to develop high-level cognitive processes and Learning for Mastery complements the procedure through feedback and correction.

Co-operative Learning is based on social cognition theories (Vigotsky, 1978) which assert that attempts to solve conflict situations occurring in interaction between pupils intensify mutual understanding (Nastasi and Clements, 1991).

In addition, when one pupil teaches another pupil, 'reciprocal learning' occurs. In order to avoid mistakes due to pupils' lack of maturity or their use of unsuitable learning tools, the teacher should make frequent use of the feedback and correction procedure (Mevarech, 1994).

Co-operative learning

For many years, the guiding principle of the frontal teaching system was the classification of pupils into homogeneous groups, streaming pupils according to achievement level. The assumption was that organising pupils together in homogeneous groups would improve the learning-teaching process and render it more efficient. However, studies relating to the effectiveness of this strategy at the end of the 1980s, showed the system to have more disadvantages than advantages (Rich, 1996).

One perception regarding the purpose of schooling is that a pupil spends several years within the school system to acquire social habits which contribute

to the pupil's view of society and will influence their perceptions as a future citizen. Having access to a variety of views and meeting pupils from various socio-economic levels is therefore likely to help the pupil develop the ability to adapt easily and to be tolerant towards 'others' with different characteristics.

Other assumption is that the encounter between children of different backgrounds is likely to enrich pupils and encourage achievement, particularly where weaker pupils are concerned.

The Co-operative Learning Theory, which is based on the above assumptions, suggests that investing efforts to improve social assimilation in a heterogeneous class could prevent weaker pupils from dropping out of the system.

The co-operative approach of Teaching for Mastery includes five main components:

- The teacher's performance,
- The nature of the learning task,
- The pupils' performance,
- The physical arrangement of the classroom,
- The quality of communication within the class.

The teacher must therefore plan learning activities that allow for a flexible learning pace according to the pupils' varying abilities.

1. The teacher's performance: The teacher should plan activities suitable to different cognitive styles.
2. The nature of the task: The teacher should plan the social composition of
3. The pupils' performance: Those who will do the task.
4. The learning environment: The teacher should arrange the learning environment in such a way that the above tasks can be implemented and

5. Quality of communication within the class: The teacher should afford social interaction that helps to improve listening abilities and negotiating skills between the pupils.

Of the many existing Co-operative Learning systems, it is important to mention those that encourage group investigation and internal motivation. The sub-groups focus on enhancement of learning achievements:

1. Student-Team-Achievement–Divisions (STAD)
2. Teams-Games-Tournament (TGT)
3. Team-Assisted-Individualisation (TAI)

The second sub-group encourages both group investigation and fosters internal motivation and reward. The system was developed for classes with multiple heterogeneous elements such as: personal differences, different socio-economic backgrounds and sometimes even different languages spoken in their homes.

One example employed in Israel is the Jigsaw Group (Aronson, 1978). In this system, the teacher divides the class into groups and each pupil receives learning material on to study and gain an initial impression. The pupils then each choose one subject in which they would like to specialise and which they will subsequently teach their peers in the main group. When each 'expert' teaches his home group, the issue is discussed to clarify the material.

Each pupil is then tested on the entire subject material and the results are published. The pupils' desire to achieve high marks for their group increases their internal motivation.

Other co-operative learning systems also employed in Israel are Group Investigation and Learning Together (Hertz-Lazarovitz and Fuchs, 1987).

Complex Learning

Complex Learning deals with a heterogeneous class from the social angle, and is based on Expectation Theory, which indicates that pupils who succeed in school have a higher social position in the class and more is expected of them.

Children who so not do well in school, on the other hand, have a lower social status, less is expected of them and, more importantly, their own expectations from themselves are low. Complex Learning, unlike other methods, tries to deal with social status in the context of participation in learning situations, based on new concepts regarding intelligence that emerged at the end of the 1980s (Gardner, 1996, Sternberg, 1990).

The new multi-skills approach identifies different types of intelligence, moving away from the traditional one-dimensional approach and advocates a change in learning situations:

1. In the nature of learning tasks.
2. In the organisation and running of the class.
3. In the teacher's role.

The multi performance learning approach has the potential to improve the pupils' participation in class activities and thus to reduce gaps between pupils (Ben Ari& Eliasi, 2005).

To conclude: teaching methods have employed two main approaches towards heterogeneity in a class:

- The learning achievement approach which aims to promote individual achievement.
- The social approach which identifies heterogeneity as a mixture of different social groups with different background data.

Each of these approaches has influenced definitions of teaching goals, class time management and organisation of learning environments. Although all the above-mentioned approaches require changes in the roles of the pupil, and teacher and even alteration of the school's structure, nevertheless the education system in the Western world is still searching for scientific educational research and development that will enable schools to attain their goals as institutions for learning.

Experiential Learning

One of the methods of teaching used in active learning (see 293 above) is 'experiential learning', a process in which students take part in direct experimentation, and discover the knowledge for themselves instead of learning from the experience of others, or obtaining the knowledge in theoretical form (Itin, 1999). Emphasis is given to the positive role of the pupil's activity and action in constructing knowledge (Lampert, 1990; Steffe & Gale, 1995).

Experiential learning is derived from the constructivist approach to knowledge that developed in the 1970s and 1980s (Driver & Oldham, 1986; Von Glasersfeld, 1995a). Constructivism is itself derived from early theories concerning learning in the field of development psychology and sees the construction of knowledge as a process in which the learner processes and interprets new information and assimilates it within knowledge already existing in the learner's mind. This knowledge is evident when the learner understands and applies concepts correctly in different learning situations.

To summarise the constructivist approach to learning:

1. Knowledge needs to be constructed by the learner with the help of concepts already known to the learner through activation of these concepts.

2. The learner constructs new knowledge on the basic of previously acquired concepts, comparing them to the new knowledge, by adding them to the new knowledge and constructing links between them and the new knowledge.

3. The information that the teacher delivers to the pupils only becomes significant when it is influenced by a process of knowledge construction by the learner (Lampert, 1990; Steffe & Gale, 1995).

With regard to the constructivist's perception of the teacher's role, Von Glasersfeld (1995b) indicates that the teacher should assist the pupils rather than teach them. In his view, effective assistance does not include

presentation of a solution or the correct answer, but should focus the learner's attention on an aspect that the learner's thinking process has neglected. According to this view teaching is a form of discourse, including a process of perceptual change for the learner. Activities such as these necessitate an open class climate enabling flexible thinking and ability to function even though things are not yet absolutely clear.

In recent years, academic learning programmes have increasingly included methods which can enable active, experiential learning by students (Caplan et al., 2007). The constructivist approach assumes that learning through experience leaves a significant mark on the learner (Bion, 1962) not only in the way in which knowledge is broadened but also in altering cognitive structures and attitudes and broadening the learner's range of skills when relating to the studied issue (Johnson & Johnson, 2005).

The teaching of existential learning (Kolb, 1983) relies on the guidelines of Dewey (1933) indicating that learning should be founded on experiences, and on the theory of Piaget (1964) who saw cognitive development as a result of the interaction of man with the environment.

According to the model of Kolb (1983) concrete experiential learning occurs in a cyclic process of four stages:

a. the learner experiences the situation through concrete experience.

b. the learner observes and reflects (reflective observation).

c. the learner generalises and conceptualises the knowledge relying on existing points of agreement (abstract conceptualization).

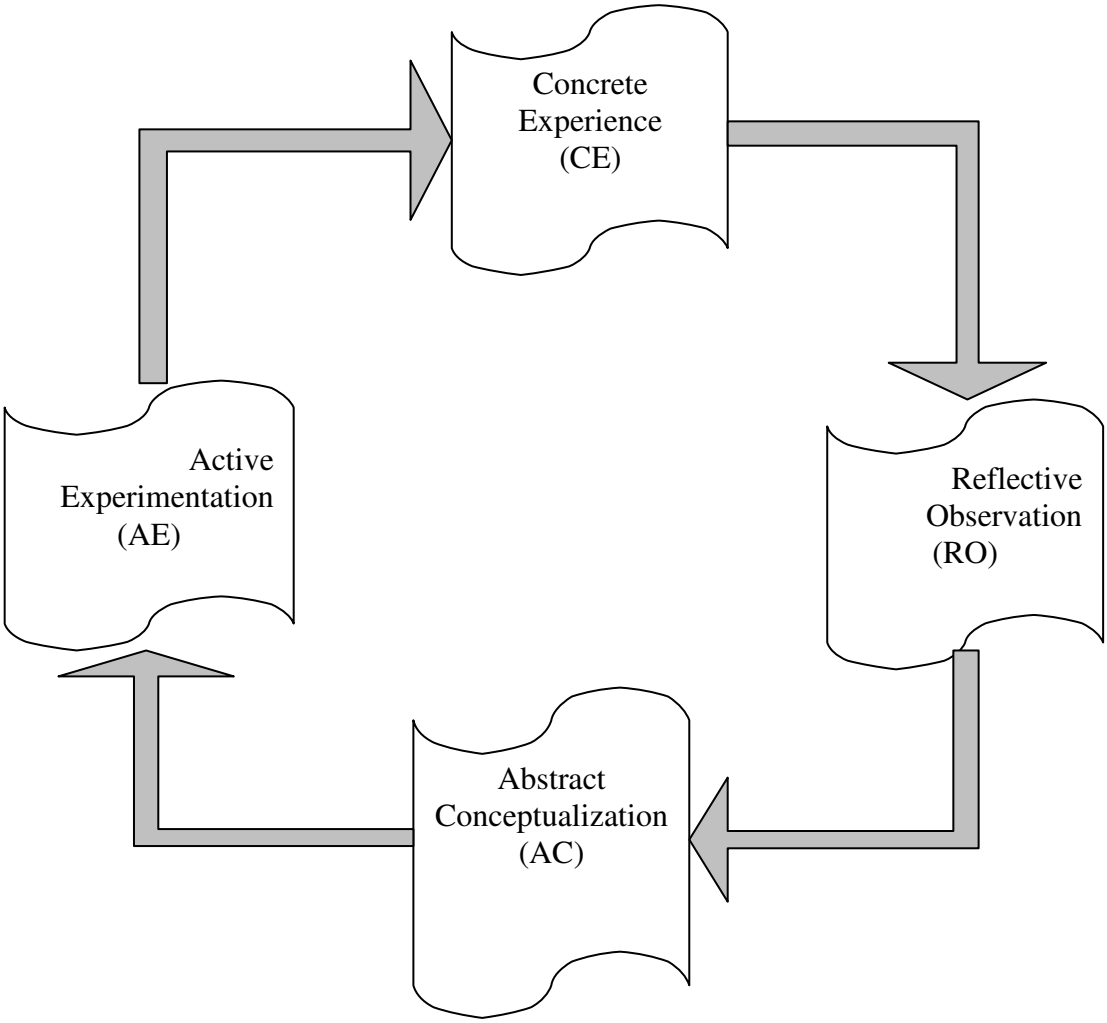
d. the learner examines what has been learnt in new situations, leading to additional experimentation (active experimentation). See Figure A2 below (Kolb's four-stage model of experiential learning).

Innumerable articles have been written on experiential learning, both supportive (Sims & Sims, 2006) and critical (Kayes, 2002), and this is sometimes expressed in debate between those in favour of experiential learning and those who oppose it (Tobias & Duffy, 2009). An example of the difficulties involved: children's skills differ from adults in many ways; they do not have all the cognitive abilities that adults have such as conditioned knowledge or content knowledge so that it is ineffective to ask them to act as investigators when studying sciences (Tobias & Duffy, 2009).

Interest in experiential learning grew substantially from 1871-2005 and more than 2,200 articles appeared on this issue in this period. Even today many researchers continue to take an interest in and investigate this methods and at least 300 additional articles on the matter have appeared since 2005 (McClusky de Swart, 2010).

Advances in Internet technology have opened a window of opportunities for researchers to enter the site of Professor Kolb and listen to his lecture on experiential learning and to read many new articles in this area (see: http://www.learningfromexperience.com).

Figure A2: Kolb's 4 stage model of experiential learning



APPENDIX 3.1 THE VARK TEST (HEBREW VERSION)

שם התלמיד_____ שם המורה_____ הכיתה_____

שאלון

עליך להקיף את תשובתך בעיגול.

1 כאשר יש לך כמה דקות ואין לך מה לעשות, אתה מעדיף:
a לבהות בחלל או לקשקש.
b לדבר עם עצמך או עם אחרים.
c לקחת משהו לקרוא.
d לעשות משהו , כמו לתקן משהו, או לסדר את החדר.

2 אתה לא בטוח איך צריך לכתוב "מעתפה" או "מעטפה", מה תעשה?
a תחפש את המילה במילון.
b תחשוב על המילה בראש ותבחר.
c תגיד בקול מילים מאותה משפחה ותבחר.
d תכתוב את שתי המילים על הדף ותבחר.

3 אתה מתכנן מסיבת הפתעה ליום ההולדת של חבר טוב שלך, מה תעשה?
a אדבר על זה בטלפון עם שאר החברים.
b אעשה רשימה של הדברים שצריך לעשות ולקנות.
c אתכנן את אירועי המסיבה בראש.
d אזמין חברים ונתחיל להתקדם.

4 אתה עומד לבנות משהו מיוחד למשפחה, מה תעשה?
a תעשה משהו מבלי צורך בהוראות.
b תדפדף בכמה ספרים ועיתונים ותחפש רעיונות.
c תעדיף ספר מיוחד בו יש הוראות מדויקות.
d תדבר על זה עם כמה חברים.

5 אתה מרוצה מהתוכנית לקיץ שקיבלת. זה גם מעניין שני חברים שלך, מה תעשה?
a תיקח אותם לראות את התוכנית בפעולה.
b תראה להם את האינפורמציה שקיבלת על זה.
c תתחיל להתאמן על הפעילויות שתעשה בתוכנית.
d תתאר לחברך את הפעילויות שאתה תעשה בכל יום בתוכנית.

6 אתה עומד לקנות סי די חדש, פרט למחיר, מה ישפיע על הבחירה שלך?
a מה שהמוכר בחנות אומר לך על זה.
b קריאת הפרטים על הסי די.
c הפעלה של הסי די בעצמך והקשבה לו.
d הצורה של הסי די מוצאת חן בעינך.

7 **נסה להיזכר כשלמדת תוכנית מחשב חדשה, או משחק לוח, כמו דמקה או שש בש, איך למדת הכי** טוב?
a ראיתי אחרים ששחקו בזה.
b קראתי את ההוראות.
c הקשבתי למשהו שהסביר איך משחקים.
d ניסיתי את זה בעצמי.

8 אחרי שקראת מחזה, אתה צריך לעשות פרוייקט על זה בכיתה, האם אתה מעדיף?
a לקרוא חלק מהמחזה לפני הכיתה.
b לצייר פלקט שמראה משהו שקרה במחזה.
c לשחק חלק מהמחזה.
d לכתוב משהו על המחזה.

9 קיבלת ליום הולדתך מחשב חדש ואתה עומד לחבר אותו. האם אתה תחילה?
a תפתח את החבילה ותתחיל לחבר את החלקים.

b תקרא את ההוראות שבאות עם המחשב.
c תטלפן לחבר ותשאל שאלות בקשר לזה.
d תסתכל על הציורים שבתוך חוברת ההסברים ועל הקופסא.

10 אתה צריך לכוון שני חברים כיצד להגיע לבית לא רחוק מה תעשה?
a תצייר מפה על פיסת נייר.
b תגיד להם במילים איך להגיע.
c תכתוב להם במילים איך להגיע.
d תלך איתם בעצמך עד לבית.

11 יש לך בעייה בברך, וזה כואב לך כאשר עתה עושה ספורט, אתה מעדיף שהרופא?
a יסביר לך מה לא בסדר.
b ייתן לך לקרוא מאמר המסביר את הבעייה.
c יראה לך בדיאגרמה ובשרטוט מה לא בסדר.
d ידגים בעזרת מודל מה לא בסדר.

12 סרט חדש מגיע לעיר מה משפיע עליך ללכת (או לא ללכת) לסרט?
a שמעת חברים מדברים על הסרט.
b קראת ביקורת על הסרט בעיתונים.
c ראית תקציר בסרט או בטלויזיה על הסרט.
d זה מתאים לסוג הסרטים שאתה אוהב.

13 האם אתה מעדיף מורה אשר אוהבת להשתמש ב:?
a בספר או בחוברת.
b דיאגרמה, תרשימים, תמונות, או שקפים.
c טיולי שדה, מעבדות ולמידה פעילה.
d דיון בכיתה או הרצאת אורח.

APPENDIX 3.2: DETERMINATION OF PUPILS' LEARNING STYLES BY TEACHERS AND PUPILS

Table 3.1 Views of Teachers and Pupils concerning the Pupils' Learning Styles with Diagnosed Learning Style according to VARK questionnaire

Class E1Teacher: T.

Name of pupil	Pupil's learning style according to teacher	The teacher's view of the pupil	Pupil's remarks on grammar lessons and their preferred learning styles	Pupil's learning style derived from the pupil's expressions in column to the left according to criteria in Appendix 3.3	Diagnosed learning style according to VARK questionnaire				K	R	A	V
AA	K	Emotional and intelligent girl, loves practical things and understands them in depth. Kiinaesthetic - K	I think the teacher should explain the material, diagrams trips to us, but it does not matter, as long as you understand - a lot of Hebrew mistakes	K				K	6	1	3	3
AB	R	Intelligent student, quiet, studies well, a quick thinking, industrious, loves to read- R	I love the most to learn from travelling and experiments and reading	RK		A	R	K	6	5	6	2
AC	VR	Diligent outgoing girl love to learn, read and write. Industrious	I love it when teachers teach in a fun way of playing, hiking, reading, see a film and listening to music.	VARK	V	A	R	K	6	6	5	5
AD	R	Good-hearted boy, Mediocre	I think the most when the teacher explains and writing.	R			R		2	6	1	4

Name of pupil	Pupil's learning style according to teacher	The teacher's view of the pupil	Pupil's remarks on grammar lessons and their preferred learning styles	Pupil's learning style derived from the pupil's expressions in column to the left according to criteria in Appendix 3.3	Diagnosed learning style according to VARK questionnaire				K	R	A	V
AE	VA	Intelligent pupil, likes the scientific disciplines likes doing the main thing talks, a good athlete	I love to learn a) with friends and to see film b) from books, I'd rather the teacher explains the matter, I think that grammar lessons really interesting, it's important to know the grammar, because of the need to know how to spell nouns etc.	AV	V		R	K	7	7	2	8
BF	VR	Clever insecure pupil, with a sharp eye, a little snoozy	I love learning about books, who wrote them, meet the writers, with the best book I read, I think I'm learning from it, and it will help me in life	R	V	A	R		1	3	4	5
BG	K	Friendly and intelligent pupil Fluent, talkative good student. K	I most love to try things and learn by doing experiments, for example in science class last year, we learned about animals, and we went to the zoo and did experiments. They let us touch and try and build all sorts of things related to animals	K			R		3	5	3	2
BH	VA	A clever kid, investor, and has a sharp eye, he has no friends, knows what he wants and a little stubborn	I love to learn through clear explanations and I think the grammar lesson is an important lesson, in that lesson we learn to speak and write and read correctly	R	V	A	R	K	4	3	4	2
BI	AR	A child with a lot of energy, thorough, quick and loves to delve deeply, clever, but not studious, and does not like to read	The grammar lesson is Important , so we know how to speak correctly and to let us know if a word is male or female, so that we will not have spelling errors	R			R		3	8	4	5
BJ	K	Nag, very intelligent girl, sarcastic, stubborn, aggressive, difficult and needs constant movement.	I think grammar is an important subject, and I like it a bit but I love more learning in trips and outside and read a book, and watching television	VARK	V	A	R	K	4	9	6	3

Name of pupil	Pupil's learning style according to teacher	The teacher's view of the pupil	Pupil's remarks on grammar lessons and their preferred learning styles	Pupil's learning style derived from the pupil's expressions in column to the left according to criteria in Appendix 3.3	Diagnosed learning style according to VARK questionnaire				K	R	A	V
CK	V	A sensitive child, sociable, but he does not like to read and write, an Intelligent child	I think that the grammar is an important lesson, if we had no grammar lesson we had a lot of writing and spelling errors	R			R	K	5	6	3	1
CL	R	Shy girl intelligent and polite, good student	I love learning through fun like going out and doing experiments, I prefer the teacher to teach well so that things are clear and the teacher to be Indulgent; I think that grammar lesson is a very important one because there we learn difficult words, and how to read correctly.	RK	V	A	R	K	5	6	3	7
CM	K	A smart, stubborn boy, does not flow and does not like to read and write, he loves to play, is not friendly, he prefers facts, numbers and diagrams, is rigid, understands and performs what is important, is realistic, accurately assesses things.	I prefer a nice female teacher to teach, and prefer diagrams and explanations and interesting projects, I think grammar is one of the most important subjects	VRK	V	A	R	K	7	10	7	10
CN	K	Intelligent child, stubborn and difficult withdrawn. Kinaesthetic - K	Its best to learn through travelling. I prefer the teacher to teach outside, the grammar lesson is important because our grammar should be clear and correct	K	V	A			2	2	4	5
CO	K	Intelligent and sensitive girl she loves activity and can sit and learn when necessary, complying with tasks, she loves activity	I think that the grammar lesson is an important lesson because in this class we learn how to read and write correctly	R	V	A	R	K	7	2	6	4
DP	K	Isolated child, is physically, intelligent, but likes to play it safe, needs order, is not spontaneous	I think that the grammar lesson is important because that is the way we learn to speak and write correctly, but I do not really like the class.	R	V	A		K	8	1	6	4

Name of pupil	Pupil's learning style according to teacher	The teacher's view of the pupil	Pupil's remarks on grammar lessons and their preferred learning styles	Pupil's learning style derived from the pupil's expressions in column to the left according to criteria in Appendix 3.3	Diagnosed learning style according to VARK questionnaire				K	R	A	V
DQ	K	Very stubborn girl, a little aggressive, not thorough enough wastes time, rigid, unfriendly, not a good student	I love learning with new guests, diagrams, lectures, tours and games and little homework	VARK	V	A	R	K	6	3	5	4
DR	R	Sensitive and intelligent and friendly girl expresses herself well, invests efforts – from the settlement of Rehasim.	Grammar is important to me, because I love grammar, read books. When I have a lot of free time I revise the material, I love learning through trips and labs, so we can see and understand sometimes when I do not know my neighbours help me, I have two neighbours and both are teachers	VARK	V		R		2	6	4	1
DS	K	Aggressive child, physical, persistent and intelligent, not gentle, and does not have many friends	I like it when the teacher told us to write a story	R				K	6	2	2	3
DT	R	Clever, open, friendly, learns well, interested in things	I like to study via the Internet because it helps me a little bit more then class, or through trips and labs.	K	V	A		K	4	2	5	4
EU	VARK	Very intelligent, polite and civilized. He can read and learn, very friendly and mature behaviour, maintains respect between him and the others doesn't really bother anyone, you can count on him	My name is EU I'm age 10, I love to swim and play table tennis, my afternoon hobby is playing football, I like field trips and to study with active learning laboratories, I prefer the teacher to teach in a fun-like and enjoyable way, I do not think that grammar is such an important lesson. I do not like the grammar classes. Because I do not really understand and verb I'm of Russian origin and it is hard for me but I want to know writing and reading correctly	KR	V	A	R	K				
EV	VK	Child has no patience to read and prepare work and he does not like to sit and learn, mostly likes to play, is mainly at the side, closed not involved in the company of others	I want the teacher to teach with pictorial animation. Grammar lesson is important, because I can learn words and speak well	RV	V		R	K	7	6	1	7

Name of pupil	Pupil's learning style according to teacher	The teacher's view of the pupil	Pupil's remarks on grammar lessons and their preferred learning styles	Pupil's learning style derived from the pupil's expressions in column to the left according to criteria in Appendix 3.3	Diagnosed learning style according to VARK questionnaire				K	R	A	V
EW	RV	Girl is very original, artistic inclinations, friendly and flowing, open, likes to read and write, songwriter. Mature not childish, a good student, summarises the material	My name is EW, and I love to study with the exercise books? without homework, for example in grammar lessons, grammar is an important lesson that we need to know to read and write Hebrew	R	V	A	R	K	7	8	6	5

Class E2Teacher: T.

Name of pupil	Pupil's learning style according to teacher	The teacher's view of the pupil	Pupils' remarks on grammar lessons and their preferred learning style	Pupil's learning style derived from the pupil's expressions in column to the left according to criteria in Appendix 3.3	Diagnosed learning style				K	R	A	V
EX	A	Childish, clever and a bit slow and he does not like to learn - Auditory	I do not like to learn, but I am helped by talking with friend,	A				K	6	2	5	1
EY	RA	Very realistic, intelligent, likes dealing with data	I prefer the teacher to teach in the grammar of sports and I think this is an important discipline and it's the most comfortable way for me to learn how to read and write Read phonetically	R	V	A	R	K	6	5	4	3

Name of pupil	Pupil's learning style according to teacher	The teacher's view of the pupil	Pupils' remarks on grammar lessons and their preferred learning style	Pupil's learning style derived from the pupil's expressions in column to the left according to criteria in Appendix 3.3	Diagnosed learning style				K	R	A	V
FZ	K	Girl who loves action, her friends, likes to talk a lot, does not like to read and write. is more Kinaesthetic, is not stupid but she's not a scholarly type	I love most to learn with activity and reading book, and questions. The teacher should teach some of the material and let us find the other material by ourselves	RVK	V	A	R	K	8	5	11	8
FA	A	A child who likes to talk, loves to hear conversations, smart and very intelligent kid, friendly, likes group learning	My name is e Elroy Goldman Class E2 Grammar is an important subject because they teach us how to learn Hebrew grammar correctly, I love to learn when the teacher talks orally about the subject matter	A	V	R	A	K	3	7	7	1
FB	VARK	A good student, loves to read, but does not like to write, short answers. He's smart. Loves to learn, does not like working in the group. Stands alone and is interested in science etc. intelligent and knows many things	I love to learn with the help of tours and read, and experiments until I understand the material, I do not like to learn in a lazy way	RK	V	A	R	K	4	3	4	5
FC	K	Weak kid tires easily during long period in class	I think that in the lesson we need to learn who to read and write without mistakes	R	V	A	R	K	3	3	3	5
FD	K	A child who does not like to read, he has no patience, bouncy	This child did not write about himselfn	,				K	8	2	2	5
FE	R	Highly intelligent child, reads and writes, goes straight to the point , knows how to organize the material	Grammar lesson is Important for me but I do not like to study it. I do like to study all the subjects listening to stories.	A		A			2	3	7	2

Name of pupil	Pupil's learning style according to teacher	The teacher's view of the pupil	Pupils' remarks on grammar lessons and their preferred learning style	Pupil's learning style derived from the pupil's expressions in column to the left according to criteria in Appendix 3.3	Diagnosed learning style				K	R	A	V
GF	V	Girl insecure, is gentle, she hides herself, medium student, she does not like to read and write prefers more visual learning	I like best to learn when they show us that they give us something if we act nicely. I want the teacher to teach by adding something funny. I think the grammar class is an important lesson, but it's quite difficult for me. Other than that I manage very well	VK	V	A	R	K	7	10	4	9
GG	K	Intelligent child, boring not so acceptable in society, emotional, stubborn and he does not like to read and write, is more Kinaesthetic	I prefer the teacher to teach with an exercise book because there are a lot of pictures and activities. I think grammar is very important subject	VARK	V	A	R	K	6	8	7	4
GH	VA	Clever, friendly, childish, likes to listen, does not like to read and write. He flows, is not studious	I am Haniel, a child who loves animals. I would prefer to learn threw listening to cassettes and lectures.. I think that the grammar class is good I might have more vocabulary if I had more lessons	A	V	K			8	2	2	9
GI	K	Stubborn child, Kinaesthetic, he does not like to read and write, he likes to hear and do. Nags a bit	I would like to learn with the teacher asks us to read and write the subject matter, grammar is an important subject because of the need to understand difficult words and more mature words	R	V	A	R	K	3	6	9	5
GJ	K	Girl loves company but is not accepted, does not read and write a lot, she loves to sing and dance and perform, she is Kinaesthetic	*I understand when I read. But I also love to learn outside the grammar class. It is important for us to know how to speak and write the grammar correctly*	RK	V	A	R	K	3	9	5	9

Name of pupil	Pupil's learning style according to teacher	The teacher's view of the pupil	Pupils' remarks on grammar lessons and their preferred learning style	Pupil's learning style derived from the pupil's expressions in column to the left according to criteria in Appendix 3.3	Diagnosed learning style				K	R	A	V
HK	A	A child with abilities, but he does not like to read, does not like doing things, likes writing short texts, a little stubborn, but does not like to study, he has no friends and is not involved in society, is more Auditory	I prefer the teacher to teach me in a clear and convenient way in the lab, the grammar class is quite enjoyable - the grammar class is important, because you need to learn how to write	K	V	A		K	11	1	6	7
HL	R	A good student. she reads and writes sentimental, intelligent loves reading, but has mood swings	I love to learn the grammar when the teacher let us to write about it in class, I think that the grammar class is an important lesson	R			R		2	8	3	1
HM	K	Strange girl, intelligent, rude, is not friendly, stubborn, she is Kinaesthetic and likes reading less. A good athlete	I love to learn outside on walks, it would be best if the teacher would teach out of school. grammar is an important subject because we learn our grammar better	K			R		5	6	2	2
HN	A	He likes to listen a lot, to really receive serious explanations. He is a poor student, shy, and closed. The teacher says he is Auditory, he likes explanations short and to the point	I learn better when I am helped that way I learn well. Trips and lab, see a pictures, and I understand when the teacher read and explain to me	VAK	V	A	R		11	6	9	8
HO	R	The teacher did not write her impressions of this pupil	I learn better when I read and write in class	R			R		0	10	3	0

Name of pupil	Pupil's learning style according to teacher	The teacher's view of the pupil	Pupils' remarks on grammar lessons and their preferred learning style	Pupil's learning style derived from the pupil's expressions in column to the left according to criteria in Appendix 3.3	Diagnosed learning style				K	R	A	V
JP	A	Weak girl, not a friendly child, not strong academically, introverted, has no fluent thought, will not read much	I love to learn in a fun way When the teacher asks to write a funny story and I think that the grammar class is very important	R		A			3	4	5	1
JQ	R	Intelligent girl, very sociable and creative, hard-working and excellent in writing and reading	I usually go over the material with Mom, its easy for me when someone helps me in class. I prefer the teacher to teach with exercise books and textbooks also when we read the book and we are working in the exercise book. I think that the grammar class is a very important, that in the future we should know how to read and write and stuff like that. In my opinion the grammar class is very important	R	V	A	R	K	5	6	6	5

Class F Teacher: L.

Name of pupil	The teacher's view of the pupil	Pupils' remarks on grammar lessons and their preferred learning style	Pupil's learning style derived from the pupil's expressions in column to the left according to criteria in Appendix 3.3	VARK Test Results				K	R	A	V
JR	Pretty mature tough and cunning boy, but not a good student, does not likes to read, withdrawn and not accepted by society – Kinaesthetic	A story about myself, when I go to school I'm very bored, and don't like homework, and never did homework in Bible studies but I love learning through trips and labs. And that's the end of the story	K	V				3	4	1	6
JS	Gentle and polite boy, very intelligent, organised and tidy, a good student. reads a lot and visual - VR	I like to learn from books and exercises on the subject, grammar is important and an interesting subject for life, it helps you read and pronounce words correctly, and read stories	R			R		2	6	3	3
JT	Good-hearted Boy, cute, friendly, intelligent, polite, organised and tidy, a little childish, likes to read Read / Write - R	I love to learn in a fun way, it means a lesson where all the class will participate and that no one will barge in, everyone will be relaxed. I'd rather that when the teacher teaches he'll enjoy, and there would be enough time to run through the material. the grammar lessons are as important as all other subjects so that we can know how to pronounce the Hebrew grammar	R			R		4	8	2	0
KU	Problematic boy, very stubborn, violent, he has no friends in class, not reading perpetually, cannot read intently Auditory-Visual VA	I love to learn without shouting, grammar is an important profession, in this profession you learn the Hebrew grammar, how to read and write correctly	A		A			4	4	5	2
KV	Sensitive girl, loves to discuss things and talk. Socially she is very caring, loves the other children and group work, not a lot of patience to read, is good in art, Kinaesthetic-K	Hello my name is KV, I love it when the teacher tells us to read and explain, I think that the grammar lessons are important, because when you grow up and don't know the grammar, you have difficulties in life	RK	V	A	R	K	7	7	4	4

Name of pupil	The teacher's view of the pupil	Pupils' remarks on grammar lessons and their preferred learning style	Pupil's learning style derived from the pupil's expressions in column to the left according to criteria in Appendix 3.3	VARK Test Results				K	R	A	V
KW	Very friendly boy, loves to play during the breaks, talks a lot, is a clever but has no patience, and is not so mature. Kinaesthetic - K	I love to learn through play, I usually do not think grammar is an important lesson, because I do not like the subject of grammar so much	K	V	A	R	K	4	7	5	4
KX	Cute kid, very polite and friendly, not annoying, likes to draw Visual-V	Once I went to the zoo and saw monkeys, giraffes and tigers, panda, snakes and a guinea pig there	V	V	A	R	K	5	3	2	4
KY	Stubborn but very methodical and organized, he can do everything VARK	I love it when the teacher explains the lessons well with pictures and diagrams, and gives examples in lessons, the grammar lesson is an important lesson, we learn about punctuation	VA	V	A	R	K	3	6	9	6
LZ	Very intelligent child, a good student, Individualistic, thinks systematically, thoroughly, likes to read can read and summarise, socially pleasant, good boy, style is Reading -R	I love to learn the way the taught any subject matter work with an exercise book and if you do not understand the teacher will explain with the help of the learning material, I think that grammar is a very important lesson, because I learn more about the Hebrew grammar, I like to speak correctly, write correctly, etc.	ARK			R	K	7	6	3	1
LA	Clever, friendly, but sometimes a little sarcastic, knows to think systematically and a bit sensitive. Reading - R	I love being taught like this: telling stories, explaining and discussion. I think that grammar is an important lesson so that when you write a letter you know where the commas or punctuation mark should be	AR			R	K	6	6	2	1
LB	Clever good girl, a good social position, nice and open, polite, likes to read and write. Reading -R	I like best to learn with a teacher that explains well, and works with a book or magazine. Grammar lessons are very important lessons, because with the help of these lessons, we learn the rules of grammar, how to write correctly and we also learn new words, and thanks to the grammar classes we also have a rich vocabulary	VAK	V	A	R	K	3	6	4	4

Name of pupil	The teacher's view of the pupil	Pupils' remarks on grammar lessons and their preferred learning style	Pupil's learning style derived from the pupil's expressions in column to the left according to criteria in Appendix 3.3	VARK Test Results				K	R	A	V
LC	A child who loves to act and do, a little lazy does not like to read, he has a good mood. Kinaesthetic-K	I prefer to learn in class when the teacher explains the material, and gives no homework, sometimes a little	A	V		R	K	8	7	2	3
LD	Friendly, mature Visual but also reads a lot Visual Reading-VR	The grammar lesson is important because we need to know to speak and write correctly. I love to read and write stories.	R	V		R		4	6	2	7
ME	Intelligent and friendly girl with confidence, likes to activate others, a good athlete, loves to learn through physical activity Kinaesthetic -K	My name is Veronica, I love my dog and play on the computer, the grammar lesson is important to speak correctly	K				K	9	2	2	2
MF	Intelligent girl, friendly, busy and open, likes movement , Kinaesthetic - K	In my opinion, grammar is an important subject, because if we do not learn grammar, we will not know how to write correctly and speak correctly, I love to learn in all sorts of ways, sometimes this way and sometimes another way, but mostly I love learning with experiments and similar things	K			R	K	6	5	2	1
MG	Quiet and gentle boy, not accepted in society, he keeps a distance from others, does not like to read and write. Kinaesthetic - K	I love to learn threw activity in the lab. I think grammar is an important lesson because you need to know to write words like how to write the word Pencil case	K				K	6	2	2	3
MH	Gentle girl loves to learn, has some tenacity. Reading - R	I like the grammar lesson best if say the teacher will explain the matter and if I do not understand the material, the teacher would take me into the teachers room and explain everything slowly and clearly	VA	V	A	R	K	5	5	3	2
MI	Good girl friendly and weak. Visual - V	I love when the teacher explains again and again until you understand the material, I think grammar is an important subject	A				K	6	4	3	1

Name of pupil	The teacher's view of the pupil	Pupils' remarks on grammar lessons and their preferred learning style	Pupil's learning style derived from the pupil's expressions in column to the left according to criteria in Appendix 3.3	VARK Test Results				K	R	A	V
NJ	Quiet girl, shy and withdrawn, is not involved in society. Does not like to read. Kinaesthetic - K	Child did not write about herself									
NK	She has a very good perception of herself, knows her value, has a very sharp eye, although she likes rules she is original and different. Reading - R	I prefer the teacher to teach me alone if I do not know something and there is not time to explain in front of everyone	A		A		K	5	3	5	2
NL	Practical girl, a doer, does not like to read and write Kinaesthetic-K	I prefer the teacher to teach and explain clearly with images.	VA	V	A	R		3	6	6	4
NM	Mature student, good, intelligent, pleasant and friendly, she likes to perform things likes to read. Visual Reading - VR	I love to learn in an active manner, such as trips that are related to the material we learn, and prefer that the teacher will teach and explain demonstrating what is explained. I think that grammar is an interesting and important lesson. In the future we have to know the grammar, and if not now we will now never know it then.	VARK	V	A	R	K	6	4	5	3
NN	A mature child not childish, a doer and quick thinking. Intelligent, genuine, mature and ambitious. Wants to succeed, and tackles the main issue. Reading Kinaesthetic-RK	I like to listen to the teacher while the teacher reads from an interesting book. The grammar lesson is an interesting and important lesson	K				K	9	2	1	2
OP	Clever, thorough, very realistic, mostly likes activities, she reads a lot and loves charts and diagrams. Kinaesthetic and Reading - RK	I mostly love learning through activities and experiments and I also prefer, if it were up to me, of course, that the teacher should teach in that way In my opinion, it is important to study grammar because that's how you learn to speak right	K	V	A	R	K	10	4	3	7

Name of pupil	The teacher's view of the pupil	Pupils' remarks on grammar lessons and their preferred learning style	Pupil's learning style derived from the pupil's expressions in column to the left according to criteria in Appendix 3.3	VARK Test Results				K	R	A	V
OQ.	A good student, quiet, pleasant, gentle, intelligent and accepted in society. Visual Reading-RK	I prefer the teacher to explain things to me separately with pictures and drawing and not in front the whole class if I do not understand	VA	V	A	R	K	4	8	6	6
OS	Creative intelligent girl, very much needs company, talks and social activities. Is not scholarly. Reading - R	I prefer the teacher to explain the grammar material. It is an important subject and we need to know the material, so that we can know how to speak and write correctly	VA	V	A	R	K	4	4	5	3
OT	A good student, friendly and loves dancing, activist, really loves to read and act with imagination, Mainly Reading-R	I love to learn from books	R	V	A	R	K	6	11	8	3
OV	A mature boy, intelligent sociable, loves to deal in matters of the rule Visual-Reading VR	I prefer to study outside as we do in sports lessons. And also with TV but most of all I love to read stories	RVK			R		5	12	4	8
OW	A good student, sociable, pleasant and orderly. Likes to read paint and use her senses actively. Visual Reading - VR	I like to learn when the teacher tells us to read and summarise	R	V	A	R	K	5	9	4	5

APPENDIX 3.3: IDENTIFICATION OF LEARNING STYLES ACCORDING TO THE PUPILS' REPORTS

These criteria were written according to the theoretical background material reviewed in Chapter 2 and specifically the models of Dunn and Dunn and Fender and Fleming (including the material from their Internet sites. The criteria underwent inspection by the teachers to examine their appropriateness.

Table 3.2 Criteria for Identification of Pupils' Learning Styles from their Reports

Visual	Auditory	Reading	Writing
School trips	Likes to read	Listening to lectures	Observing
Sport	Likes to write	Listening to taped recordings	Looking at something specific
Laboratory	To fill in work pages	Listening to conversations	Watching television
Model construction	Reading passages out loud in front of the class	Participating in class discussions	Watching films
Cutting	Reciting poems	Listening to verbal content	Watching theatrical drama
Pasting	Summarising subject matter	Listening to music	Looking at plants
Matching pieces	Answering questions	Participating in group discussions	Looking at pictures
Constructing a presentation	Recording notes in order to remember content	Speaking with and consulting friends	Examining maps
Delivering a presentation in practice	Writing into the computer		Using diagrams
Presenting something in pantomime or drama	Using a calculator		Sketching
Learning through play	Books		Watching presentations

APPENDIX 3.4: QUESTIONNAIRE FOR PUPILS AT THE END OF THE SCHOOL YEAR

Questionnaire

Please show the extent of your agreement with the following statements according to these grades

Strongly agree	Yes, I agree a lot with this
Agree	Yes, I agree a little bit with this.
Strongly disagree	No, I disagree a lot with this
Agree	No, I disagree a little bit with this.

	Statements	**Strongly agree**	**Agree**	**Disagree**	**Strongly disagree**
		Please circle one only for each statement			
1	Animations in the presentation distracted me from understanding the lesson	1	2	3	4
2	Sound in the presentation helped me concentrate on the lesson	1	2	3	4
3	Pictures made it easier for me to understand the lesson	1	2	3	4
4	Pictures in the presentation distracted me from understanding the lesson	1	2	3	4
5	Coloured text helped me understand the lesson	1	2	3	4
6	The teacher's explanations distracted me from concentrating on the lesson	1	2	3	4
7	I understood the lesson better when the presentation was shown together with the teacher's explanation	1	2	3	4
8	The teacher's explanation during the presentation was not required	1	2	3	4

9	Use of the exercise book helped me understand the lesson better	1	2	3	4
10	Use of the exercise book was not necessary because I already understood the lesson from the presentation	1	2	3	4
11	It was difficult for me to understand the lesson only from the presentation and I needed to do the tasks in my exercise book	1	2	3	4
12	Watching the presentation was sufficient to understand the lesson and I did not need to use my exercise book	1	2	3	4
13	I understood the presentation and the text distracted my concentration	1	2	3	4
14	Reading the text in the presentation helped me understand the lesson better	1	2	3	4
15	Copying the rules from the presentation into my exercise book distracted my concentration	1	2	3	4
16	Copying the rules from the presentation into my exercise book helped me to understand the lesson	1	2	3	4

APPENDIX 5.1: ANNOTATED TRANSCRIPTS OF INTERVIEWS

Interviews with pupils in Class E2 – teacher: T.

The interviews are marked as follows:

Certain positive words, such as: "fun", "nice", "great", and "helpful" are highlighted in green.

Other negative words, such as: "unhelpful", "distracted", "annoying", etc. are highlighted in red.

Words that indicate thinking, such as: "I think it is important", "habit", "need", etc. are highlighted in purple.

HM

Question: You learned new subject matter using the presentation. Was there anything in the presentation that distracted you or made it harder for you to absorb the subject matter?

Answer: No (did not distract me).

Question: There was animation and in some places the presentation stopped suddenly and you had to read something. Did this maybe distract you a little or break your concentration?

Answer: No, not at all. The animation actually grabbed my attention and I concentrated more.

Question: What else grabbed your attention and helped you concentrate?

Answer: When there were voices in the presentation, or funny pictures in the presentation, and in my opinion when we had to read the sentences aloud when the presentation stopped that actually really helped me understand the subject matter.

Question: Did you notice the coloured highlighting in the presentation?

Answer: That's right, the coloured highlighting is like a sign that makes you remember and understand better.

Question: And what about when in addition to reading from the presentation you had to take out a pencil and a notebook and copy down the rules?

Answer: Even when I copied the rules from the presentation I was not distracted. On the contrary, I felt it was easy for me to writethem because I really understood the subject matter in the presentation so if I wrote them down I was sure to remember the rules better.

Question: If you understood the presentation so well because it used voices, colour, and animation, why did you need the teacher's explanations in the middle?

Answer: We are used to hearing the teacher's explanations; when she explains the subject matter to us I repeated it quietly to myself and understood it better. Sometimes the teacher's explanations made me notice something I hadn't really noticed in the presentation. Besides, the teacher gave us examples, and examples always make it easier for me to understand and remember.

Question: I see you didn't think the teacher's explanations were unnecessary; so maybe after both the presentation and the teacher's explanations the additional work with the workbook was unnecessary?

Answer: It was fun to work through the workbook because I felt the subject matter was easy and it helped me concentrate, so I don't think the workbook was unnecessary.

Question: If you found working through the workbook so important, maybe it was actually hard to understand the presentation on its own and the workbook was essential.

Answer: No. I understood everything from the presentation, but sometimes even after you understand something you forget a little and when you work through the workbook you concentrate on the subject matter again and that helps you understand. My mom also says that it is important to practice.

EY

Question: Some people think that animation and voices are only attention grabbers and that kids notice only the animation and do not concentrate on the subject matter that the presentation is meant to teach.

Answer: Whoever says that doesn't understand anything; the animation and voices are exactly what kept us all quiet and made us concentrate on the presentation. In a regular lesson the teacher asks everyone a thousand times to stop playing with all sorts of things and pay attention to her. In the lesson with the presentation she never had to ask.

Question: And was it like that with you?

Answer: The voicesdidn't really help me concentrate. Sometimes they were startling.

Question: When you had to read what was written in the presentation, did that help you concentrate and understand?

Answer: No. It bothered me. I like watching the presentation and learning from it without it stopping and being asked to do things.

Question: Do you think reading the sentences in the presentation is unhelpful?

Answer: I'm not saying that. I think it helped me, but I don't like it when they stop the presentation. I didn't like it when they stopped the presentation and I had to copy the rules either.

Question: And when they didn't stop the presentation, but the teacher explained something in the middle?

Answer: That didn't bother me. I understood better when the teacher explained things.

Question: And the explanations were not unnecessary?

Answer: Not unnecessary.

Question: And when you quietly worked through the workbook did that help you concentrate on the subject matter?

Answer: If nobody stops me in the middle and they give me enough time then it helps me.

Question: What else in both the workbook and the presentation helped you concentrate?

Answer: When things are highlighted in colour that helps.

Question: And what did you think of the voices in the presentation?

Answer: Not really, they don't help.

Question: I see the presentation helped you, yet you still liked the teacher's explanations. The presentation wasn't enough?

Answer: No. It is important to hear the teacher's explanations as well.

Question: And what about practicing with the workbook. Is that useful?

Answer I think it is.

Question: So the presentation and the teacher's explanations helped, and so did copying the rules into your notebook?

Answer: No. That bothered me and wasted time.

Question: Without practice would it have been difficult for you to understand the subject matter from the presentation alone?

Answer: Not difficult.

Question: But you said working through the workbook was important.

Answer: That's right. It isn't hard to understand the subject matter from the presentation, but practice is important and helpful.

Question: Was there anything in the presentation that was a little confusing?

Answer: When there were too many pictures I couldn't really concentrate on the subject matter.

FD

Question: In grammar classes we used a presentation. Occasionally the teacher added explanations. Did the presentation help you absorb the subject matter better?

Answer: The lessons with the presentation were fun. The presentation really helped me absorb the subject matter, but I felt the workbook practice was also very important. The two together helped me and the animation was interesting and sometimes funny.

Question: The animation didn't bother you?

Answer: Not at all. It was interesting to watch the presentation when there was animation and it helped me remember things.

Question: And did the voice in the presentation help?

Answer: Yes. It helped me concentrate, when I read along in the presentation I really felt the subject matter was easy and I understood what was expected of me. When there were a lot of pictures I was a little confused; that's why I think working with the workbookhelped me.

Question: What about the teacher's explanations?

Answer: I don’tthink the explanations during the presentation were unnecessary.

Question: You said working with the workbook helped you, but you already understood the subject matter from the presentation and from the teacher’s explanations.

Answer: Sometimes they were enough and the workbook was a little unnecessary. But I think that working with the workbookhelped me concentrate, and it was also a review of the subject matter. It was only annoying when the teacher asked us to read aloud passages from the presentation.

Question: Correct me if I am wrong, but I understood from what you have said that reading sentences aloud from the presentation and too many pictures distracted you.

Answer: Yes. That is what I think. I liked the teacher’s explanations, they did help me concentrate. The explanations and practice helped me remember the subject matter I understood from the presentation.

Question: What else distracted you?

Answer: It annoyed me when we had to copy the rules into our notebooks; that was a little boring. And I felt it broke my concentration.

Question: Which combination do you think best helped you concentrate, absorb, understand and remember?

Answer: I think the best combination is when the presentation is interesting and has funnyanimation, the teacher explains in the middle, and then lets you work quietly with the workbook. That helps me remember the subject matter .

FZ

Question: In your opinion, is it easier to learn and understand subject matter in a regular lesson or one with a presentation?

Answer: In a regular lesson I sometimes get bored and think of other things and don’t really listen. But with the presentation it was interesting, especially the animation; and because of the voice in the presentation I watched it and remained concentrated. I also liked the pictures, and because of the pictures I listened and watched the presentation all the time; there were a lot of pictures in the presentation and it is always easier to learn when there are pictures, because then I am fascinated and I concentrate.

Question: But in the lessons with presentations the teacher asked questions, asked you to read aloud and answer questions, and that broke your concentration?

Answer: Not at all. When I read the sentences aloud it actually helped me understand the subject matter better.

Question: Did you notice the coloured highlighting in the presentation? How did that help you?

Answer: I didn't notice any highlighting. It didn't help me.

Question: What about a presentation lesson is it like a regular lesson?

Answer: Working with the workbook. But in our classes the workbook always followed the presentation, so I already understood and knew the subject matter from the presentation and it was easy for me to solve problems in the workbook. In my opinion working with the workbook helped me concentrate.

Question: If you already understood from the presentation then maybe the workbook was unnecessary?

Answer: No. It helps and it is easy and it makes me more confident that I understand everything.

Question: When the teacher asked you to copy rules from the presentation, was that also easy and fun?

Answer: No, that was annoying; copying rules down for no reason doesn't help you understand.

Question: Without the practice, would you say you understood less?

Answer: No way, I understood perfectly from the presentation.

Question: Maybe the teacher's explanations were boring? Because you already understood the presentation?

Answer: True, I understood, but I felt that I understood even better after the teacher's explanations.

Question: And they didn't break your concentration?

Answer: No. They were related to the presentation, and I continued to watch the presentation.

JQ

Question: What helped you learn the subject matter most in our grammar lessons?

Answer: The voice in the presentation helped me.

Question: How did it help?

Answer: It helped me concentrate. It drew my attention to what was shown in the presentation.

Question: Do voices usually help you? What other sounds?

Answer: When I read aloud from the presentation for example, it helped me.

Question: Didn't it break your concentration on the presentation when you read aloud?

Answer: Didn't bother me at all.

Question: I see that you like learning while hearing things.

Answer: Yes. It also helped me learn when the teacher explained things related to the presentation.

Question: Besides the voice, what about the pictures and animation? Did they also help you absorb the subject matter?

Answer: On the contrary. The animation was pretty, but it broke my concentration. It isn't easier when there are pictures, they are unnecessary.

Question: Did the coloured highlights in the presentation confuse you as well?

Answer: No, they were not just for decoration, they helped.

Question: How is it easier for you to learn? With a presentation or a workbook?

Answer: It is most fun with the presentation. I understood the subject matter nicely with the presentation.

Question: And you didn't need to practice with the workbook?

Answer: I understood everything from the presentation but working with the workbook gave me more. I think working with the workbook is important.

Question: And the notebook?

Answer: It was fun copying the sentences into my notebook; it makes me feel that I understand.

GH

Question: Do you think the animation helped you understand the subject matter?

Answer: It was funny and interesting, and it helped me watch and listen with interest.

Question: And the pictures never drew your attention too much and distracted you from the subject matter?

Answer: What are you talking about? When there are pictures I always concentrate and manage to learn best; I wish they taught every subject with pictures; it's fun.

Question: And the colour highlights?

Answer: I like highlighting important things, it helps a lot.

Question: Besides the pictures, there were voices; did they help you absorb the subject matter?

Answer: Unlike the pictures, the voices bothered me and broke my concentration.

Question: And what about your own voice when you had to read aloud?

Answer: That didn't bother me.

Question: And what about the teacher's voice? When she explained things while the presentation was running?

Answer: Not really -I understood everything anyhow. It only helped me when I read aloud.

Question: I see that the teacher's explanations did not help you concentrate.

Answer: It didn't bother me, but I already understood and I don't need it.

Question: In your opinion is a presentation good enough? Is there no need for a teacher in the classroom?

Answer: I don't think so. Even though I understood the subject matter from the presentation itself, maybe the teacher's explanations helped me understand better somehow.

Question: I see the presentation was interesting and you could have managed to understand the subject matter, but it is still important to hear the teacher's explanations as well. What about practicing with the workbook? Is that important or not?

Answer: Of course it is important, even though I understood the presentation; you need to practice with the workbook.

Question: And the notebook? Was it important to copy the rules into your notebook?

Answer: Man, that was the most annoying, that was boring.

HN

Question: What do you think about the pictures and animation in the presentation?

Answer: The animation was funny and the pictures were pretty, it was fun to learn with the presentation.

Question: And they didn't distract you from learning?

Answer: The animation and pictures didn't bother me, only when there were a lot of pictures it bothered me a little. I think if there weren't so many pictures it wouldn't have bothered me.

Question: And what about the words that are highlighted in colour?

Answer: That is good; it emphasizes important things and helps you understand the subject matter.

Question: Besides pictures, there was voice in the presentation. Did that help you?

Answer: The voice did not help me concentrate; the teacher's voice when she explained things actually did help, as well as the voices of the other kids when we read sentences aloud. But when I had to read the sentences aloud it seemed unnecessary and it broke my concentration.

Question: And what about writing, copying the rules to your notebook, and working with the workbook?

Answer: When I worked with the workbook I felt I was really concentrating and I understood the subject matter, so in my opinion it is not unnecessary.

Question: And when you copied sentences and rules?

Answer: It is important and it summarizes the subject matter.

HK

Question: What was it about the presentation that helped you understand and absorb the subject matter the most?

Answer: Mostly the animation and pictures helped me.

Question: Did the highlighting and colouring of words help you?

Answer: In my opinion it helped, a lot.

Question: You understood the subject matter through the presentation. Did you find the workbook unnecessary?

Answer: No. I think it helped me concentrate on the subject matter.

Question: Writing helps you organize the subject matter. Did it help you when you copied sentences from the presentation into your notebook?

Answer: I think that also helped me really understand; it made me confident that I understand.

Question: You say you understood the presentation. What about the teacher's explanations?

Answer: It is true that I understood the subject matter from the presentation, but I absorbed it better when the teacher added her explanations and when she stopped the presentation and we had to read sentences and rules aloud. Sometimes when I read aloud it broke my concentration.

Question: What about the voice in the presentation?

Answer: It drew my attention and helped me understand what was being explained.

JP

Question: In grammar class we used a presentation. Did you learn better?

Answer: It depends. There were things in the presentation that helped me understand and there were others that bothered me.

Question: What bothered you for example?

Answer: I enjoyed the animation, but I forgot what we were learning. The voices helped me, and also when the presentation stopped and we needed to read aloud it helped me concentrate.

Question: What about the pictures and animation?

Answer: The pictures didn't bother me; they actually helped me concentrate; when there were a lot of pictures I felt it was easier to learn.

Question: You said the voices in the presentation helped. What about the teacher's voice and explanations?

Answer: The teacher's explanations helped me and weren't unnecessary anymore. Without the explanations I might have been confused. When the teacher stopped and explained something in the middle of the presentation it helped me understand.

Question: Do you learn well when you hear things?

Answer: Yes that is why we read the sentences in the presentation aloud. I felt that it helps me absorb the subject matter. Animated pictures bothered me.

Question: Can you point out anything else that helped you understand the subject matter?

Answer: Working with the workbook helped me a lot.

Question: Were there cases where the presentation helped you even without practicing with the workbook?

Answer: Yes. There were parts of the presentation that I understood immediately, but I still think practicing with the workbook helps me.

Question: Which part of the lesson would you forego?

Answer: I didn't like being asked to copy parts of the presentation into my notebook. That was boring and completely unnecessary.

EX

Question: Should we continue to learn grammar using the presentation?

Answer: Yes. We should.

Question: What is it about the presentation that helps you concentrate on the subject matter?

Answer: The voices and having to read the sentences and the fact that each time there were words highlighted in colour all helped me concentrate on the subject matter.

Question: During the lesson the teacher also interrupted the presentation and explained things, did that blend in or did it break your concentration?

Answer: When the teacher explained during the presentation, it was important, that way we knew what to pay attention to, she explained in her own words and I understood well what the presentation was trying to say. She also asked questions, and if someone did not understand she explained again.

Question: The teacher also asked you to copy rules. Why do you think she did that?

Answer: When I write things down I actually concentrate on the subject matter, working with the workbook also helped me concentrate.

Question: And when you had to read what was written in the presentation aloud?

Answer: Yes. That helped me concentrate as well.

Question: The presentation included many pictures. What do you think about that?

Answer: It's good. It makes the presentation more interesting. When there was animation it bothered me and I could not concentrate on the subject matter.

FB

Question: What do you think about the grammar lessons that use a presentation?

Answer: I liked them.

Question: The animation, pictures, and voices, what helped you learn?

Answer: I liked it the most when there were pictures in the presentation; it was easy for me to learn when there were animation and pictures. The voices also helped me concentrate.

Question: What about working with the workbook?

Answer: That also helped me concentrate; but I already understood the subject matter from the presentation.

Question: Did reading aloud from the presentation help you?

Answer: Yes. It helped a lot.

Question: Did writing down the rules help you?

Answer: That was annoying. It may have helped me understand, but dealing with pencils and writing was disruptive and it stopped the presentation.

Question: What do you think about the teacher's explanations that accompanied the presentation?

Answer: As long as we could see the presentation, whether it was running or it stopped, the teacher's explanations helped and checked whether or not I understood.

Question: I see you liked seeing the presentation through without stopping. What about when you had to read rules and sentences from the presentation aloud?

Answer: It didn't bother me when we were asked to read sentences from the presentation aloud.

Question: What annoyed you about the lessons?

Answer: When they would stop the presentation and ask us to work with the workbook. That annoyed me.

Question: Do you think working with the workbook is unnecessary?

Answer: Yes. Working with the workbook is definitely unnecessary.

HO

Question: In grammar classes we learned with a presentation. What was it about the presentation that helped you learn? Voices, pictures, animation, highlighted words?

Answer: I liked the animation. It was fun and really helped me understand the subject matter. I also liked the pictures in the presentation. It was easy for me to understand and learn. The voices in the presentation also helped me.

Question: What else helped you understand the subject matter? When you read aloud?

Answer: Yes. That helped. And the coloured words too.

Question: There are kids who said that reading the sentences broke their concentration. What do you think?

Answer: I disagree. Both the animation and the reading aloud helped me concentrate.

Question: What broke your concentration on the subject matter?

Answer: Working with the workbook. That was boring and I started doing other things.

Question: Would you say the pictures really helped you concentrate and learn?

Answer: Of course they helped.

Question: And what about the teacher's explanations?

Answer: I thought they were unnecessary. They annoyed me and broke my concentration.

Question: What else did you find unnecessary?

Answer: Working with the workbook. Because I already understood the subject matter and it was just annoying.

Question: Weren't there times when you felt that practicing with the workbook helped you understand the subject matter after all?

Answer: Sometimes practicing with the workbook helped; but when we had to write it was boring. It is boring when you copy the rules from the presentation into your notebook.

FC

Question: What was it about the special grammar lessons with the presentation that helped you learn the subject matter well?

Answer: I understood better when we worked with the workbook, the pictures, the colour of the words, when we read aloud.

Question: What about the teacher's explanations?

Answer: When the teacher explained absorbed the subject matter better. The explanations helped me understand.

Question: And when you had to copy the rules?

Answer: Yes. That helped too.

Question: The voices, animation, teacher's explanations, and working in the notebook, were all of these important to your absorbing and understanding the subject matter?

Answer: Yes. I think so. I understood everything from the presentation, the workbook was practice, but when you write things down you remember what you wrote better.

HL

Question: Tell me what you think of the presentation; the animation, the voices, working with the workbook, the pictures; what helped you understand the subject matter, absorb it?

Answer: The animation didn't bother me, and neither did the pictures. The voices in the presentation did not help me concentrate.

Question: And what about the teacher's voice, her explanations?

Answer: The teacher's voice didn't bother me.

Question: Did it help you concentrate? Absorb the subject matter better?

Answer: No. It didn't bother me, but it didn't help me particularly.

Question: And did reading the sentences off the board help you?

Answer: It didn't help me.

Question: The pictures didn't bother you. Did they help?

Answer: They didn't help.

Question: Did the coloured words help you?

Answer: Yes they helped.

Question: In our lessons we worked with the workbook as well. What do you think about working with the workbook? Does it help? Is it unnecessary?

Answer: Working with the workbook really helps you concentrate on the subject matter, although you understand from the presentation, but you need to work with the workbook too.

Question: Besides writing in the workbook there were times when you needed to copy the rules from the presentation into your notebook. Did you find that unnecessary?

Answer: When I copy the rules it helps me understand the subject matter.

Question: Am I to understand that watching the presentation on its own is not enough?

Answer: Right.

Question: What things in the presentation helped you learn the subject matter the most?

Answer: The pictures helped me the most.

GJ

Question: Do you think we should continue teaching grammar using our method with the presentation and practicing with the workbook?

Answer: Yes. You really should. It was fun!

Question: What helped you concentrate in particular? Maybe the voices in the presentation?

Answer: No. The voices in the presentation did not help me concentrate.

Question: And working with the workbook?

Answer: Yes. That helped me concentrate.

Question: And what about reading the sentences in the presentation. Did that help you understand the subject matter?

Answer: Yes. That also helped me understand.

Question: It didn't break your concentration a little?

Answer: No way.

Question: Did you notice the coloured highlighting in the presentation? Did that help?

Answer: Yes. It helped me a lot.

Question: Did you manage to absorb things better when the teacher explained during the presentation?

Answer: Yes. I managed to learn better that way.

Question: And when she asked you to copy rules from the presentation into your notebook, did that help you understand as well?

Answer: Yes. It helped me understand the subject matter.

Question: And it didn't break your concentration when you stopped suddenly and copied the sentences?

Answer: No. Not at all.

Question: And weren't there things in the presentation that distracted you? Like lots of pictures and animation?

Answer: What are you talking about? The animation didn't bother me at all, I liked the fact that there were lots of pictures; it made it more interesting and easier to learn.

Question: And you never forgot what you were learning because there were too many pictures?

Answer: No. The pictures helped me concentrate and learn.

Question: Did you understand the subject matter easily from the presentation?

Answer: Yes. It was fun to learn with the presentation.

Question: Maybe the presentation is good enough and the teacher's explanations are unnecessary?

Answer: No. The explanations were important and they didn't bother me in the middle.

Question: And working with the workbook?

Answer: No. That was good. Sometimes the presentation goes by fast and you need to practice with the workbook to understand. Just watching the presentation isn't enough. You always need to practice.

GG

Question: How would you summarize our grammar lessons with the presentation?

Answer: It was fun, but sometimes there were too many animation sequences and pictures and that hindered my ability to absorb the subject matter .

Question: The presentation had voice as well. Did that bother you too?

Answer: That actually helped me concentrate.

Question: And the words that were marked in another colour?

Answer: That helped me understand, it is clearer that way.

Question: And when you read sentences from the presentation aloud, did that help you understand or did it bother you?

Answer: That also helped me and didn't bother me.

Question: And when the teacher stopped the presentation and explained things, did that help you?

Answer: Yes. That helped me and didn't bother me.

Question: And it wasn't unnecessary?

Answer: When the teacher explains it always helps.

Question: And working with the workbook?

Answer: Yes. It helps to review the subject matter . And without the workbook I think the subject matter would not have been clear to me.

Question: And copying the rules from the presentation helped you?

Answer: No. It bothered me.

Question: How did it bother you?

Answer: It broke my concentration. When you are busy writing in the middle of the presentation it is confusing. I think it is important to write down the rules. It helps, but in the middle of the presentation it is bothersome.

GI

Question: What was it about the presentation that helped you concentrate on the subject matter? The voice, the pictures?

Answer: The voice helped me.

Question: Did it also help you when you read the sentences aloud?

Answer: That also helped me understand.

Question: And the pictures?

Answer: They broke my concentration a little. I watched the characters and it distracted me.

Question: So should the pictures be removed from the presentation?

Answer: No. it is actually easy to learn when there are pictures.

Question: And the animation got in the way of your learning the subject matter?

Answer: It didn't bother me.

Question: And words highlighted in colour?

Answer: Yes. That helped.

Question: And the teacher's explanations during the presentation were unnecessary?

Answer: No. They were important.

Question: And they didn't bother you?

Answer: Didn't bother me. The teacher explains in words we understand, she gives examples.

Question: After watching the presentation you also practiced with the workbook. Did that help you understand?

Answer: Yes. It helped a lot.

Question: Was it hard for you to understand from the presentation on its own?

Answer: No. It was actually easy!

Question: So maybe working with the workbook was unnecessary?

Answer: No. It helps you remember and concentrate on the subject matter and that way I can check if I really understood.

Question: When you copied rules from the presentation into your notebook in the middle of the presentation, did that bother you?

Answer: No. It didn't bother me at all.

Question: So one might say that copying the rules helped you?

Answer: No. I understood from the presentation already. It only helps you remember and prepare for the test.

GF

Question: In grammar class we practiced with the workbook. Did the practice help you understand the subject matter?

Answer: It didn't help because I already understood the subject matter from the presentation.

Question: You had to write things during the presentation, when you had to copy the rules from the presentation into your notebook; did that break your concentration on the subject matter?

Answer: No. It didn't bother me.

Question: It helped you understand.

Answer: Yes. It helped me.

Question: Did it help you when you had to read aloud from the presentation? Or maybe it bothered you.

Answer: It didn't bother me.

Question: And did the teacher's explanations during the presentation bother you?

Answer: No. I absorbed the subject matter better when the teacher explained it, but not always. Sometimes I didn't need the explanations because I already understood from the presentation.

Question: And did the animation in the presentation bother you?

Answer: No. It didn't bother me at all!

Question: Would you recommend adding a lot of pictures to the presentation? Would it make it easier to learn?

Answer: No.

Question: Why? Did the pictures bother you?

Answer: No. But I don't think that if there are more pictures it is easier.

Question: And the words that are highlighted in a different colour?

Answer: That always helps you understand and remember the subject matter.

Question: And the voice in the presentation?

Answer: Didn't help and didn't bother me, just voices. Now I need to go out for recess.

FA

Question: The presentation included animation. Did it help you? Or maybe it did the opposite.

Answer: What are you talking about? The animation actually helps me; during the animation sequences I concentrate and remember.

Question: What about the pictures?

Answer: The pictures really jump out at me and go directly into my brain; I remember really well what we learned where there were pictures.

Question: Some people say pictures can distract you and be bothersome. What do you think?

Answer: I don't think that at all. When there were pictures my eyes were drawn to the screen.

Question: If you learned so well from the presentation, maybe working with the workbook was unnecessary?

Answer: I don't think so. I know that it is important to solve problems in the workbook. Sometimes there were things in the workbook that weren't in the presentation. If you solve problems in the workbook you can know the subject matter better and do well on the test.

Question: You can use your notebook to prepare for the test as well seeing how you had to copy the rules from the presentation. What do you think?

Answer: When I copy things I concentrate on the subject matter well.

Question: And maybe the teacher's explanations were unnecessary?

Answer: No. When the teacher explains it always helps, she explains in a way we know.

Question: Would it be difficult to understand the subject matter from the presentation without practice?

Answer: No. It is easy to understand the subject matter from the presentation. The practice only helps you remember and check if you have a good grasp on the subject matter.

Question: You didn't sit by idly and watch the presentation, you had to read aloud. Did that help?

Answer: Yes. It helped!

Question: And did the voices in the presentation help?

Answer: Sure. They attracted your attention and made you remember what was written.

Question: It didn't bother you when you had to read aloud?

Answer: It didn't bother me at all.

Question: Besides the voices, pictures, and animation there were coloured letters as well. Did they help?

Answer: Yes. It showed me what was important.

FE

Question: In our first lesson we learned with the help of a presentation and we practiced with the workbook. What helped you?

Answer: Working with the workbook didn't help me because I already understood the subject matter from the presentation and it is annoying to go over what I understood again. The teacher's explanations helped me, but when I understood already and the teacher went over it again because of other kids it bothered me.

Question: The presentation included animation, voices, pictures, and highlighted words. Did any of these bother you?

Answer: Yes. The animation bothered me.

Question: And the pictures?

Answer: It was easy with the pictures.

Question: They didn't distract you?

Answer: No. It was easy for me to understand.

Question: And did the highlighted words help you?

Answer: No. I didn't notice them.

Question: Do you think we could have forgone the workbook practice?

Answer: No. You need to practice with the workbook too.

Question: Sometimes the teacher asked you to read sentences from the workbook aloud or copy things into your notebook. Did that help you?

Answer: When I copied the rules sometimes it helped and sometimes it didn't help.

Question: Why? Did the copying bother you?

Answer: No.

Question: And what about reading sentences aloud from the presentation? Did that help?

Answer: Didn't help.

Question: And did the voices in the presentation help?

Answer: They didn't help. I concentrated on the presentation because of the pictures.

APPENDIX 5.2

ANALYSIS AT STAGE C

Table 5.3: Findings for the VARK Group

Remarks made by Members of the VARK Group			
Category 1 relating to the Visual elements of the lesson	**Category 2 relating to the Auditory elements of the lesson**	**Category 3 relating to the Reading/writing elements of the lesson**	**Category 4 relating to the Kinaesthetic elements of the lesson**
EY: *'actually the animation made everyone quiet and they concentrated on the presentation, when things are marked in colour it helps you to concentrate, when there were too many pictures it slightly confused me.'*	EY: *'the voices didn't really help me, sometimes they frightened me, I understood well when the teacher explained things*.'	EY: *'it didn't hinder me to read what was written in the presentation, it helped me, and I didn't like having to copy the rules'.*	EY: *'the work in the exercise book helped me to concentrate; it was important and also helped'.*
FZ: 'the animation and the pictures helped me to concentrate; I don't pay attention to the coloured marking.'	FZ: 'the voices in the presentation helped, the teacher's explanations strengthened my understanding'.	FZ: 'reading sentences out loud helped me to understand, copying the rules from the presentation – it's annoying.	FZ: work in the exercise book helped her to concentrate, and gave her a sense of confidence.
FC: *'it helped me to learn the subject matter well, the pictures and the emphasis with colour'.*	FC: *'when the teacher explained, it helped me.'*	FC: *'it helped me to copy the rules; it helped me to understand the subject matter.'*	FC: *'they helped him? To study the subject matter well, the work in the book, helped him? To remember well.'*
GJ: Emphases in colour: *'They helped me a lot' 'The animations didn't hinder me; I loved the fact that there were a lot of pictures, so that it was more interesting and easier to learn. The pictures helped me to concentrate and learn*.'	GJ: *'No, the voices in the presentation didn't help me to focus'* The vocal explanations of the teacher *'I succeeded in learning better' 'They were important and they didn't interfere in the middle'.*	GJ: Reading sentences – *it helped me to understand'* Copying the rules in writing *it helped me understand the subject matter.* It didn't hinder her to copy the rules.	GJ: Work in the exercise book? *'Yes it helped me to focus, 'it was good. Sometimes the presentation goes too fast and you need to practise in the exercise book to understand, looking at the presentation isn't enough, you have to practise.'*
JQ: *'exactly the opposite, it was beautiful, the animation but it interfered with my concentration, It isn't easier when there are pictures they're just pictures. The **coloured emphasis** wasn't just decoration, it helped.'*	JQ: *'the presentation's voices helped me, it helped me to concentrate. It attracted my attention to what they showed in the presentation and also when the teacher explained*	JQ: *'for example it helped me when I read out loud things from the presentation, generally it didn't hinder me to read out loud from the presentation, it was fun to copy the sentences in writing, that*	JQ: *'I understood from the presentation but the work in the exercise book was a bonus for me. I think that work in the exercise book is important.*

Remarks made by Members of the VARK Group			
Category 1 relating to the Visual elements of the lesson	**Category 2 relating to the Auditory elements of the lesson**	**Category 3 relating to the Reading/writing elements of the lesson**	**Category 4 relating to the Kinaesthetic elements of the lesson**
	orally concerning things relating to the presentation it helped me to learn.'	*way I felt I understood.'*	
FB. *'I liked the pictures in the presentation best; it was easy for me to learn when there were animations and pictures.'*	FB: *'the voices also helped me to concentrate, all the time whether the presentation continued or stopped, but we could see it, the teacher's explanations helped, and also tested whether I understood.'*	FB: *'the reading out loud from the presentation helped me a lot to focus, it was annoying, it may have helped me to understand, but the business with the pencils and writing hindered me and it stopped the presentation. It didn't hinder me when they asked us to read sentences from the presentation out loud.'*	FB: *'this also helped me to focus, but I already understood the subject matter from the presentation. Yes, the work in the exercise book is definitely unnecessary.'*
GG: *'But sometimes there were too many animations and pictures and that hindered me from absorbing the subject matter. The words which were coloured helped me understand, it's clearer like that.'*	GG: *'The voices actually helped me to concentrate. The teacher's oral explanations also helped me and it didn't hinder me when the teacher explained that always helps.*	GG: *'reading sentences out loud also helped me and didn't hinder me.* ***Copying the rule from the presentation*** *– that hindered me from concentrating when you're occupied with writing in the middle of a presentation that's confusing – I think that it's important to write the rules, it helps, but in the middle of the presentation it interferes.*	GG: *'Yes it helps, to revise the subject material. And without work in the exercise book I don't think I would have understood the subject matter.'*
GI: *'the pictures slightly disturbed my concentration, I looked at the figures and that hindered me. It's actually easy to learn when there are pictures, the animations don't interfere, nor do the coloured emphases.'*	GI: *the voices helped me, the teacher's oral explanations were important – they didn't hinder me. The teacher explains in words that we understand she gives examples.*	GI: *'reading the sentences out loud from the presentation also helped me to understand, when we copy the rules in writing it didn't hinder me at all, copying from the presentation, it helped me to remember and to prepare for the exam.'*	GI: *Practising in the exercise book helped me a lot to understand, and it also helps me to remember and to concentrate on the subject matter, so that I can check whether I really understand.'*

Remarks made by Members of the VARK Group			
Category 1 relating to the Visual elements of the lesson	**Category 2 relating to the Auditory elements of the lesson**	**Category 3 relating to the Reading/writing elements of the lesson**	**Category 4 relating to the Kinaesthetic elements of the lesson**
GF: *'the animations didn't hinder me at all. The pictures didn't interfere, but I think that if there were more pictures it would be easier.* ***Words emphasised with colours*** *always help me to understand and to remember the subject matter'.*	GF: *'no, I absorbed the subject matter better when the teacher explained, but not always, sometimes I didn't need the explanations, because I already understood from the presentation. The voices in the presentation didn't help and didn't hinder, they were just voices.'*	GF: *'when we had to copy from the presentation – no – it didn't hinder me from concentrating on the subject matter. It helped me to understand. To read out loud from the presentation didn't bother me.'*	GF: *to practise in the exercise book didn't help because I already understood the subject matter from the presentation.'*
FA *'not at all, the animation actually helped me, during the animations I concentrated and remembered, the pictures really stood out and they really were absorbed well in my mind, I really remember what we learnt when there were pictures. I really don't think that's so* [that the pictures can distract attention and interfere] *when there were pictures my eyes were drawn to the screen. The coloured emphases explained what was important.'*	FA *'no, when the teacher explained it always helped, she explains using a method that we know. The voices in the presentation attracted our attention, to remember what was written.'*	FA: 'when *I copy I focus well on the subject matter. It helps to read out loud from the presentation.'*	FA: *'I don't think that's so, I know it's important to solve exercises in the book; sometimes there were things in the book that didn't appear in the presentation. If you solve the exercises you get to know the subject better and succeed in the exam, No, it's easy to understand from the presentation, exercises just help to remember and to test whether we have command of the subject matter.'*

Conclusions for the VARK Group

Conclusions concerning EY

The Visual elements assisted him a lot, but the multiplicity of pictures was slightly confusing. The voices in the presentation were not meaningful, the teacher's oral explanations were significant, it is possible that the sounds in the presentation were not relevant for him, but since he is used to listening to the teacher – this helps him, perhaps the sounds were simply not meaningful, but the explanations of the teacher were more important for him. Similarly with regard to writing, since he is a very intelligent pupil, sounds which have the function of drawing attention, are not important for him. Although copying the rules has no meaning of itself for him, nevertheless he distinguishes between the two types of writing: writing when it is used for solving things or to show understanding, and when the contents of the writing are important, constitutes a challenge for him and he enjoys it. The multiplicity of learning styles did not hinder EY's absorption of the subject matter, nevertheless what mainly assisted him to concentrate were the animations and the explanations and exercises assisted him to understand.

Conclusions concerning FZ

The multiplicity of styles did not hinder her rather they assisted her concentration and all the different styles strengthened her understanding and confidence that she understood what was being discussed. FZ notes two things that did not support her understanding and mastery, when she had to copy the sentences into her exercise book, and the coloured markings. From the conversation with her it appeared that she understood that they were tackling an issue through several different styles and the multiplicity of styles gave her a sense that her knowledge was becoming stronger through these styles, and the variety attracted her attention: *'it's true that I already understood from the presentation and although it was easy for me to solve problems in the exercise book, it gave me a feeling that I understood the subject matter better, like overcoming something and any additional work helps you to master the subject material and it's not boring to do several activities on the subject*'.

Conclusions concerning FC

The combination of styles assisted him very much, the presentation assisted him to absorb the subject matter and the explanation by the teacher assisted him to understand and the exercises in the book helped him to remember. Since FC had weak academic achievements, and since each section had a short span it assisted him to maintain his concentration and prevented him from tiring, unlike regular lessons in which he tired easily after a short time.

The teacher said that FC was a weak pupil who tires after a few minutes and stops working.

Conclusions concerning GJ

GJ said that the Visual elements in the lesson assisted her a lot, she liked the pictures which were interesting for her and they helped her to concentrate and learn. The voices in the presentation did not help her to concentrate and she felt that the teacher's oral explanations assisted her to learn better. Copying the rules in writing and reading out loud from the presentation did not hinder her but actually assisted her to understand the subject matter. She really enjoyed the Kinaesthetic work in the exercise book, it helped her to practise the subject matter, we can see that she is a clear VARK type, she experienced only assistance from all the different styles that were provided in the lesson apart from the sounds in the presentation which were not connected with the learnt material and hindered her learning.

Conclusions concerning JQ

In the Visual part of the lesson JP felt that the picture interfered with her learning while the coloured emphases were something she felt helped her to learn. Contrastingly the Auditory part assisted her a lot as did the voices in the presentation that attracted her attention and helped her to focus as did the teacher's oral explanations. The Reading/writing element was also experienced as helpful and caused pleasure; she was helped by the experience of reading out loud from the presentation and also enjoyed writing out the rules in her notebook. She thought that the Kinaesthetic element was important, here she

did not report on her feelings rather what she thought was important. To summarise JP experienced help from all the elements although the pictures and animations hindered her.

Conclusions concerning FB

FB loved the presentation pictures and also noted that it was easy for him to learn, meaning that the Visual element helped him to learn. The Auditory element also assisted FB to learn, to focus and also the teacher's explanations helped him to check if he had understood, the effect of Reading/writing can be divided into two – he was helped by reading out loud from the presentation but was annoyed when he needed to write the rules from the presentation. He experienced the work in the exercise book as a hindrance (the Kinaesthetic element), and reported that it was *'definitely unnecessary'*. In sum, although his learning style was VARK, FB was hindered by the Kinaesthetic element and the writing.

Conclusions concerning GG

GG reported that the Visual element sometimes hindered his learning, the animation and pictures; in contrast the coloured emphases were experienced as *'clearer'*. The Auditory element helped him to learn, both the voices in the presentation and also the oral explanations of the teacher. The Reading/writing element assisted him with one reservation: he went from what he felt: that the writing during the cessation of the presentation annoyed him to what he thought: that it was important. *'I think that it's important to write the rules, it helps, but in the middle of the presentation it interferes.'* How did he experience the Kinaesthetic element, here too he used his discretion and thought and not what he felt and he expresses this succinctly: *'without the work in the exercise book I don't think I would have understood the subject matter.'* To summarise, although GG had a VARK learning style in general he was assisted by all the elements but with reservations concerning the animations, pictures and writing.

Conclusions concerning GI

GI was assisted by the animations and the emphases used in the Visual part of the lesson. The pictures hindered his concentration to some extent, the Auditory elements helped him and he thought that the teacher's oral explanations were important: *'the teacher explains in words that we understand, she gives examples.'* The Reading/writing element also helped him – the reading out loud helped him to understand while the writing of the rules from the presentation helped him to remember and to prepare for the exam. GI also reported that the Kinaesthetic element assisted him to understand, to concentrate on the subject matter and to check *'whether I really understood'.* In sum, GI was diagnosed as having a VARK learning style and was indeed assisted by all four elements with a slight reservation concerning the pictures that hindered his concentration a bit.

Conclusions concerning GF

GF, diagnosed as having a VARK style enjoyed the Visual element of the lesson; she was just uncertain whether too many pictures made the learning easier. She experienced the Auditory element of the lesson as helpful especially the teacher's Auditory explanations and she noted that if she already had understood then she didn't need an extra explanation, and in her opinion the voices *'were just voices'* and didn't nor did they hinder her. The reading writing element assisted her, both the writing of the rules and also reading out loud from the presentation, but she did not need the Kinaesthetic element because she had already understood the subject matter from the presentation. In sum GF experienced assistance from all the elements while she expressed reservations concerning the voices in the presentation and the Kinaesthetic element.

Conclusions concerning FA

FA who had been diagnosed as having a VARK style enjoyed the Visual element of the lesson: *'the pictures really stood out and they really were absorbed well in my mind, I really remember what we learnt when there were pictures.'* The Auditory elements also helped him, both the teacher's

explanations and the voices in the presentation *' The voices in the presentation attracted our attention, to remember what was written.'* Even the Reading/writing elements helped him *'when I copy I focus well on the subject matter. It helps to read out loud from the presentation.'* He was also helped by the Kinaesthetic element and explained: *' I know it's important to solve exercises in the book, sometimes there were things in the book that didn't appear in the presentation. If you solve the exercises you get to know the subject better and succeed in the exam.'* In sum, FA was assisted by all the elements in the lesson.

Summary of Findings for the VARK Group

The group of pupils diagnosed with the VARK learning style was assisted by all the elements that were employed in the lesson: Visual, Auditory, Reading/writing and Kinaesthetic. Their experience was that these elements assisted them in understanding and absorbing the studied subject matter and they used expressions such as: it was easy to learn ~ pleasure and fun ~ liked it ~ loved it ~ I understood better ~ and concentration ~ interesting and attention ~ we would be quiet and concentrate on the presentation ~ strengthened confidence ~ that I understand everything ~ it helped to remember better and to prepare for the exam ~ helped to exercise ~ contributed to her ~ tested whether I had understood.

No one element was found that sweepingly hindered this group, the teacher's oral explanations were experienced by all the pupils in a positive manner, they emphasised that this was important, perhaps they were trapped in their habits of frontal teaching and so they could not say something else. Reading out loud from the presentation did not hinder them. The Kinaesthetic work was experienced as assisting them to practice and to master the subject matter. Here and there, there were negative remarks but these were marginal. In sum the VARK group experienced assistance from the lessons which combined different teaching styles. It appears that when the VARK group did work by themselves such as Reading/Writing or Kinaesthetic work, it gave them a sense of capability, since they said that it helped them to concentrate and listen.

Table 5.4: Findings for the A Group

Remarks made by Members of the A Group			
Category 1 relating to the Visual elements of the lesson	**Category 2 relating to the Auditory elements of the lesson**	**Category 3 relating to the Reading/writing elements of the lesson**	**Category 4 relating to the Kinaesthetic elements of the lesson**
JP said that there were cases in which the Visual elements interfered so much that he forgot what subject was being studied, in contrast there were cases where the Visual elements assisted him to concentrate and he actually enjoyed learning through these Visual elements.	JP: oral elements always assisted him to understand.	JP: this element assisted him to absorb the subject matter, there were times when he felt that it was superfluous, meaning that Reading/writing did not bother him unless it was unnecessary 'boring and completely superfluous'.	JP claimed that this element assisted him a lot.
FE noted which elements disturbed him, the animations hindered him and this movement on the screen hindered his concentration and learning. In contrast the Visual elements such as the colouring for emphasis assisted him.	The sounds in the presentation did not hinder FE at all and even assisted him, but the teacher's explanations of things already understood, hindered him.	FE's said the same as JP	FE understood the need for exercises and if it was Kinaesthetic it was fine. He said that it helped him a lot
Summary: for the pupils in the A group, a few static Visual elements were helpful but moving Visual items hindered their learning.	Summary: Although the Auditory elements of themselves did not hinder the learning of the A group, they were annoyed when they expressed something that was already understood.	Summary: reading and writing apparently do not hinder the absorption of the subject matter unless it was already understood in which case it is superfluous	Summary: here there was a difference of opinion but they do not try to avoid the fact that as FE understands, the exercises in the exercise book are necessary, as seen also in Group R.

Summary of Findings for the A Group

According to the words of FE and JP, who were diagnosed with learning style A, when the Visual element was static and minimal it helped them to learn while when there were moving Visual elements this hindered them. It is clear that the Auditory elements do not hinder them but they are annoyed when they have already understood the subject matter and it is repeated. They have a similar conception of the Reading/Writing element, which of itself did not hinder their absorption of the subject matter, unless they had already understood the subject matter in which case it was considered unnecessary. Both pupils felt that the Kinaesthetic elements assisted them.

Table 5.5: Findings for the VK Individual

Remarks made by Members of the VK Individual(only one pupil in this group)			
Category 1 relating to the Visual elements of the lesson	**Category 2 relating to the Auditory elements of the lesson**	**Category 3 relating to the Reading/writing elements of the lesson**	**Category 4 relating to the Kinaesthetic elements of the lesson**
GH expressed pleasure and explained that these elements assisted him and improved his concentration. *'They helped me to concentrate and listen'*.	These elements hindered his concentration with one reservation concerning the Auditory element of the teacher's explanations. He said that the teacher's words sometimes helped him to understand better and sometimes when he had already understood the subject matter and the teacher repeatedly went over it again *'it was irrelevant, I had anyway already understood, it only helped when I read out loud'.*	His consideration of these elements was divided, not unambiguous: *'it was annoying'*. In some places they were superfluous: *'it was irrelevant'* and there were places where they hindered him, but also places where they assisted him. It seems that when he needed to read something from the presentation it assisted him and when he needed to write something in the exercise book he felt 'ouf, that was the most annoying, it's irrelevant'.	These elements helped him

Summary of Findings for the VK Individual

The elements which were not related to GH's style of learning hindered him, yet with regard to the Reading/writing elements, although reading did not hinder him, yet writing did hinder him.

Table 5.6: Findings for the VAK Individual

Remarks made by Members of the VAK Individual (in this group only one pupil)			
Category 1 relating to the Visual elements of the lesson	**Category 2 relating to the Auditory elements of the lesson**	**Category 3 relating to the Reading/writing elements of the lesson**	**Category 4 relating to the Kinaesthetic elements of the lesson**
These elements assisted HK.	These elements helped HK.	HK: *'it hindered my concentration when I read out loud, the pupil who read out loud in front of the pupils in the class sometimes is more focused on how his reading will be accepted by the other pupils in the class, whether he is expressing the words correctly, whether his voice quivers and so he is not focussing on the content of the words, but when he reads silently that helps him to understand, he collects his thoughts, it gives him confidence and helps him to understand', 'it really helped me to understand, gave me confidence that I understand'* (I had an additional interview with the pupil and he explained.	These elements assisted him to concentrate on the subject matter.
Summary of Findings for the VAK Group: HK's learning styles assisted him, when he read out loud he was focussed on 'how' and not 'what'. This pupil is a new immigrant and this may explain his fear of appearing before an audience of other pupils in the class.			

Summary of Findings for the VAK Individual

HK's learning styles assisted him, when he read out loud he was focussed on 'how' and not 'what'. This pupil is a new immigrant and this may explain his fear of appearing before an audience of other pupils in the class.

Table 5.7: Findings for the VAR Individual

Remarks made by Members of the VAR Individual(in this group only one pupil)			
Category 1 relating to the Visual elements of the lesson	**Category 2 relating to the Auditory elements of the lesson**	**Category 3 relating to the Reading/writing elements of the lesson**	**Category 4 relating to the Kinaesthetic elements of the lesson**
HN: This category assisted him: *'it was fun to learn'* but when there were a lot of pictures it hindered him slightly *'just when there were a lot of pictures it hindered me'.*	These elements did not help HN to concentrate, but they did not hinder him. Nevertheless the teacher's voice did help him *'the teacher's voice when she explained actually assisted'*.	HN felt that these elements were unnecessary and hindered his concentration, when he had to read out loud in from of the class' pupils.	These elements assisted him.

Summary of Findings for the VAR Individual

Like HK in the previous group, HN talks about a sense of embarrassment when he needs to read out loud and is therefore not focussing on the subject matter that he reads: *'but when I had to read the sentences out loud it seemed unnecessary to me and it disturbed my concentration'*. The Kinaesthetic elements which did not belong to his preferred style of learning did not hinder HN's learning.

APPENDIX 5.3:

CATEGORISING PUPILS' INTERVIEW EXPRESSIONS

Table 5.8: Categorisation of Expressions from Pupils' Interviews

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting hindrance due to the discussed element	Expressions reflecting assistance due to the discussed element
HM: R	V		*'They attracted attention, I concentrated more. Emphasising of the words with colours showed us how to remember and understand better. . The funny pictures attracted attention.'*
	A		*'They attracted attention.'*
	R		*'They helped me very much to understand the subject matter. . I felt that it was easier to write, because I really understood, I shall certainly remember the rules better.'*
	a		*'We're used to hearing explanations from the teacher; I went over it by heart and understood it better. . I noticed things that I hadn't paid attention to during the presentation. When there are examples it's easier for me to understand and remember the subject matter.'*
	K		*'Its fun, it helps me to concentrate on the subject matter. . Again we focus on the material and it helps us to understand. . My mother also says it's important to do exercises.'*

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting hindrance due to the discussed element	Expressions reflecting assistance due to the discussed element
EY: VARK	V	*'When there were too many pictures I couldn't really pay attention to the subject matter,'*	*'They make everyone be quiet and concentrate on the subject matter.'*
	A	*'They were sometimes frightening, they didn't really help me. It just didn't help.'*	*'They make everyone be quiet and concentrate on the subject matter,'*
	R	*'It interfered when the presentation was stopped. . It interfered and took up time.'*	*'I think it helped me.'*
	a		*'I understood things better when the teacher explained. . It's important to hear the teacher's explanations.'*
	K		*'If I'm given enough time it helps me. I think it's beneficial. . The exercise is important and it also helps.'*
FD: K	V	*'t confuses me a bit.'* *'Distracting.'*	*'The animation was interesting and sometimes funny. . It helped me to remember things.'* *'It was interesting.'* *'Funny animation.'*
	A		*'They helped me to concentrate.'*
	a		*'They helped me to concentrate.'* *'To remember the subject matter.'*
	R	*'It annoyed me.'* *'It was annoying.'* *'A bit boring.'* *'Disturbs my concentration.'*	*'The subject matter is easy for me, and I understand what is wanted from me.'*

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting hindrance due to the discussed element	Expressions reflecting assistance due to the discussed element
	K	*'It's a bit superfluous.'*	*'The exercises in the book are important.'* *'The work in the exercise book helped me.'* *'The work in the exercise book helped me to concentrate.'* *'It helps me to remember the subject matter.'*
FZ: VARK	V	*'The emphases didn't help me.'*	*'It was interesting.'* *'I liked it.'* *'I listened and looked.'* *'It's easier to learn.'* *'I'm focused and concentrate.'*
	A		*'I concentrated.'*
	a		*'That I understand better.'*
	R	*'It's annoying, didn't help understanding.'*	*'It helped me to understand the subject matter better.'*
	K		*'It was easy to solve the exercise book after the presentation.'* *'It helped me to concentrate.'* *'It helps, it's easy, strengthens my confidence because I understand it all.'*
JQ: VARK	V	*'It hindered my concentration, it's irrelevant.'*	*'The emphases helped.'*
	A		*'The voices in the presentation helped me to concentrate, they attracted my attention.'*
	a		*'It helped me to learn.'*
	R		*'They helped, so that I feel that I understand.'*
	K		*'It contributed something additional, important.'*
GH: VK	V		*'They were funny and interesting.* *They helped me to look and*

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting hindrance due to the discussed element	Expressions reflecting assistance due to the discussed element
			listen.' *'To become interested in it.'* *'I really did concentrate.'* *'It's fun.'* *'It helped a lot.'*
	A	*'It interfered with my concentration on the subject matter.'*	
	a	*'It was irrelevant, I don't need it.'*	*'They helped me to understand better.'*
	R	*'It's the most annoying – it's just nothing.'*	*'It didn't hinder me, it helped me.'*
	K		*'Certainly important, you have to exercise in the book.'*
HN: VAR	V	*'A lot of pictures interfered.'*	*'They were funny, the pictures were pretty, and it was fun to learn.'* *'It highlights important things and helps to understand the subject matter.'*
	A	*'It didn't help me to concentrate.'*	
	a		*'They actually helped.'*
	R	*'It seems to me superfluous and hinders my concentration.'*	*'They helped.'* *It's important it coordinates the material.'*
	K		*'I concentrate and understand the subject matter, it's not unnecessary.'*
HK: VAK	V		*'They helped me to absorb and understand the subject matter* *I think they helped.'*
	A		*'They drew attention and helped me to understand what they explained.'*
	a		*'I absorbed it better when the teacher also explained.'*

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting hindrance due to the discussed element	Expressions reflecting assistance due to the discussed element
	R	*'It interfered with my concentration when I read out loud.'*	*'It really helped me to understand.* *It gave me confidence that I understood.'*
	K		*'It helped me to focus on the subject matter.'*
JP: A	V	*'I forgot what we were learning* *It hindered me.'*	*'I enjoyed it, it's easier to learn, and it helped me to concentrate.'*
	A		*'It helped me.'*
	a		*'They helped me, they weren't superfluous, and they helped me to understand.'*
	R	*'Boring and completely unnecessary.'*	*'They helped me to concentrate; I felt that they helped me to assimilate the subject matter.'*
	K		*'Helped me a lot.'*
EX: K	V	*'Animations – hindered my concentration on the subject matter'*	*'It helped, more interesting.'*
	A		*'It helped to concentrate on the subject matter.'*
	a		*'It was important, that was how we knew what to pay attention to. . I understood well.'*
	R		*'It helped; I was actually focussed on the subject matter.'*
	K		*'It helped me to focus.'*
FB: VARK	V		*'I liked this most, it was easy to learn.'*
	A		*'They helped me to concentrate.'*
	a		*'They helped me and also checked whether I understood.'*
	R	*'It was annoying.'*	*'It helped me, didn't interfere.'*

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting hindrance due to the discussed element	Expressions reflecting assistance due to the discussed element
	K		*'They helped me to focus, they were not necessary once I understood the subject matter.'*
PA: R	V		*'I liked them, they were fun, they really helped me to absorb the subject matter, it was easy for me to understand and learn, and they certainly helped me.'*
	A		*'They helped me.'*
	a	*'They were annoying and interfered with my concentration, they were unnecessary,'*	
	R	*'It's boring.'*	*'It helped me to focus.'*
	K	*'It was boring and I began to do other things, it was superfluous* *It was boring.'*	
FC: VARK	V		*'They helped me.'*
	A		
	a		*'I absorbed the subject matter better, the explanations helped me understand.'*
	R		*'It helped me, it also helped me.'*
	K		*'They helped me, when you write you remember better what is written.'*
HL: R	V	*'They did not help.'*	*'They did not bother me, the colours helped me, and the pictures helped me the most.'*
	A	*'They did not help me to concentrate.'*	
	a	*'They did not specially help me.'*	*'They did not hinder me.'*
	R	*'They did not help me.'*	*'It helps me to understand the subject matter.'*

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting hindrance due to the discussed element	Expressions reflecting assistance due to the discussed element
	K		*'It helps a lot to focus on the subject matter; you have to work in the exercise book.'*
GJ: VARK	V		*'It helped me a lot, didn't bother me at all, I liked it, it was more interesting and easy to learn, they helped, they helped me to concentrate and learn, it was fun.'*
	A	*'They didn't help me to concentrate,'*	
	a		*'I succeeded in learning better; it helped me to understand the subject matter. . They were important and didn't disturb me in the middle.'*
	R		*'It helped me to understand.'*
	K		*'It helped me to focus, it was good, you have to exercise in the exercise book in order to understand, you always have to do exercises.'*
GG: VARK	V	*'Too many animations and pictures and that hindered my absorption of the subject matter.'*	*'It helped me to understand. . It's clearer that way.'*
	A		*'It helped me to concentrate.'*
	a		*'Yes, that helped, it always helps.'*
	R	*'It hindered my concentration, it was confusing.'*	*'It helped me and didn't interfere.'*
	K		*'It helped to revise the subject matter. . Without the work in the exercise book I think that the subject matter wouldn't have been understood.'*
GI: VARK	V	*'It interfered slightly with my concentration,'*	*'It's easy to learn when there are pictures, they didn't hinder me, it helped.'*

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting hindrance due to the discussed element	Expressions reflecting assistance due to the discussed element
	A		*'It helped me to concentrate.'*
	a		*'It helped, explaining in words that we understand, giving examples.'*
	R		*'It helped me to understand'.*
	K		*'Yes it helps, it helps to remember and to focus, this way I can check if I have really understood, it only helps to remember and to prepare for the examination.'*
GF: VARK	V	*'I don't think that it is easier if there are a lot of pictures.'*	*'They didn't hinder me, it always helps to understand and remember the subject material.'*
	A	*'It doesn't help and doesn't hinder me, it's just voices.'*	
	a	*'I didn't always need the teacher's explanations sometimes they were unnecessary.'*	*'I absorbed the subject material better.'*
	R		*'It didn't hinder me, it helped me to understand, it didn't hinder me.'*
	K	*'No, I already understood from the presentation.'*	
FA: VARK	V		*'The animations actually helped, I am focussed and remember. The pictures really jump out at me in front of my eyes and they are really absorbed well in my brain, I remember what we have learned well, my eyes were attracted to the screen, it explained what was important to me.'*
	A		
	a		*'It always helps; she explains with a method that we know.'*

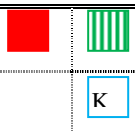
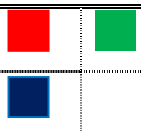
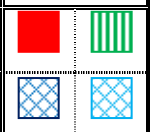
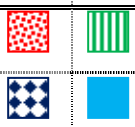
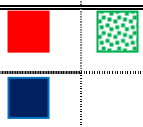
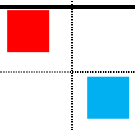
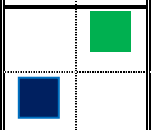
Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting hindrance due to the discussed element	Expressions reflecting assistance due to the discussed element
	R		*'I focus better on the subject matter, they captured my attention and I remember what is written, it doesn't hinder me at all.'*
	K		*'It's important to solve the exercises in the book; you can know the subject matter well and succeed in the exam.* *It helps us to remember and to check whether we have mastered the subject matter.'*
FE: A	V	*'Yes, the animations interfered, I didn't pay attention to them,'*	*'It was easy to understand.'*
	A	*'No.'*	
	a	*'If I understood and she went over it again, then that hindered me.'*	*'They helped me.'*
	R	*'Sometimes not, it didn't help.'*	*'Sometimes yes.'*
	K	*'It didn't help me; it annoyed me to do again what I had already understood.'*	*'You need to exercise it in the exercise book.'*

APPENDIX 5.4: ANALYSIS OF THE INTERVIEW DATA AT STAGE F

Findings for Three Pupils who were diagnosed as having an R learning style

The second largest group was the group of pupils who had been diagnosed as having an R learning style, the group included the pupils: HM, HL and PA. These findings are presented below in Table 5.11 with the reservation that the group was a small group.

Table 5.11:
Analysis of Expressions of 3pupils diagnosed with R learning style

Pupil's name	Criteria						
	Assisted concentration and listening /attention	Assisted subject matter comprehension	Helped to master the subject matter and remember it	Attracted attention and helped to awaken interest	Assisted in simplifying the subject matter	Helped to strengthen confidence and self-checking	Gave pleasure
PA							
HL							
HM							

Analysis of the findings from the interviews shown in Table 5.11 above in relation to the 3 pupils diagnosed with an R learning style show that each member of this group related in their interview to all the elements employed in the experimental lesson: Visual, Auditory, Reading/Writing and Kinaesthetic. Each of the rows of the table that relate to the different pupils displays all four symbolic colours representing these elements (red, green, blue and turquoise, whether the cube is filled or partially filled).

Which of the Elements (V, A, R and/or K) that appeared in the Lesson, were perceived by the Pupils diagnosed with R learning style as assisting their learning?

Analysis of the findings displayed in Table 5.11 above indicates that the pupils diagnosed as having an R learning style felt that they were assisted during the experimental lessons by the V, A, R and K elements of the lesson as follows:

V – 6 filled red cubes indicate that 6 pupils felt that they were assisted by the Visual element of the lesson

A – 2 filled green cubes indicate that 2 pupils felt that they were assisted by the Auditory element of the lesson.

R – 4 filled blue cubes indicate that 4 pupils felt that they were assisted by the Reading/Writing element of the lesson.

K – 5 filled turquoise cubes indicate that 5 pupils felt that they were assisted by the Kinaesthetic element of the lesson.

Which of the Elements (V, A, R and/or K) that appeared in the Lesson, were perceived by the Pupils diagnosed with R Learning Style as wholly or partially hindering their learning?

Analysis of the data displayed in Table 5.11 shows that the members of the R group felt that they were also hindered in their learning by V, A, R and K elements of the experimental lesson, as follows:

Analysis of the empty cubes (frame coloured and a letter indicating the style inside the cube):

2 empty turquoise cubes indicate that the Kinaesthetic element hindered the learning of 2 pupils.

There were in total 19 expressions relating to assistance and lack of assistance, only 2 of these expressions related to lack of assistance i.e. 10% of all such expressions.

Examination of the partially filled cubes (indicating an interfering element, unnecessary element, element that did not help, or boring element, meaning

that the element itself did help but one or more of its components hindered learning, as for example the claim that the Visual element helped but one of its component – the coloured emphases – hindered learning).

1 partially filled red cube related to the Visual element.

3 partially filled green cubes related to the Auditory element.

2 partially filled blue cubes related to the Reading/Writing element.

1 partially filled turquoise cube related to the Kinaesthetic element.

Closer study of the graph reveals that of the expressions relating to partial hindrance by the Auditory element, only 1 relates to the loud voices in the presentation, and **all the others related to the oral explanations of the teacher as a hindrance**. Only 1 girl spoke about a particular component of the Visual part that hindered her, too many pictures, apart from that the Visual part of the lesson did not constitute a hindrance.

Which of the Elements (V, A, R and/or K) that appeared in the Lesson, were perceived by the Pupils diagnosed with R Learning Style as assisting concentration and listening?

Study of the column 'helped to concentrate and listen' in Table 5.11 reveals that all the pupils in this group related to this issue.

All the pupils related to the Visual element, and they felt that it helped them to concentrate and listen (2 filled red cubes and one empty red cube appear in the column 'helped to concentrate and listen'). With the reservation that the pictures were superfluous, it seems that the pupils from the R group felt that the Visual element of the presentation helped them to concentrate and listen.

2 pupils from the R group related to the Auditory element expressing a feeling that the teacher's oral explanations hindered their concentration and listening.

Just 1 girl HL from group R related to the Reading/writing element which she felt made it difficult for her to listen and concentrate when she was asked to read out loud before the class.

All the pupils in the R group related to the Kinaesthetic element, including 2 who felt that it helped them to concentrate and listen although 1 pupil said that the Kinaesthetic element did not help him to concentrate and listen.

Which of the Elements (V, A, R and/or K) that appeared in the Lesson, were perceived by the Pupils diagnosed with R Learning Style as assisting subject matter comprehension?

Examination of the column 'assisted subject matter comprehension' in Table 5.11 above reveals that all the pupils in this group related to this issue.

2 pupils related to the Visual element, and felt that it helped them to understand the subject matter (2 filled red cubes appear in the 'assisted subject matter comprehension' column).

2 pupils from the R group related to the Auditory element, one of them felt that the Auditory element helped him to understand the subject matter while the other, HL felt that the voices in the presentation hindered her understanding (dotted green cube).

2 pupils from the R group related to the Reading/writing element and felt that this element helped them to understand the studied subject matter.

Only 1 pupil from the R group related to the Kinaesthetic element and felt that this element helped her to understand the studied subject matter.

Which of the Elements (V, A, R and/or K) that appeared in the Lesson, were perceived by the Pupils diagnosed with R Learning Style as helping to master and remember the subject matter?

Examination of the column 'helped to master and remember the subject matter' in Table 5.11 above reveals that all the pupils in this group related to this issue.

None of them related to the Visual element of the lesson in this context.

1 pupil from the R group related to the Auditory element, HL felt that it helped her to master and remember the subject matter.

1 pupil from the R group related to the Reading/writing element, HM helped her to master and remember the subject matter.

2 members of the R group related to the Kinaesthetic element, HL felt that it helped her to master and remember the subject matter while PA said that the Kinaesthetic element did not help him to master and remember the subject matter.

Which of the Elements (V, A, R and/or K) that appeared in the Lesson, were perceived by the Pupils diagnosed with R learning style as attracting attention and helped to awaken interest ?

Examination of the column 'attracted attention and helped to awaken interest' in Table 5.11 above reveals that all the pupils in this group related to this issue.

It was the Visual element and the Reading/writing element that attracted the attention of HL

Which of the Elements (V, A, R and/or K) that appeared in the Lesson, were perceived by the Pupils diagnosed with R Learning Style as giving pleasure?

Examination of the column 'gave pleasure' in Table 5.11 reveals that all the pupils in this group related to this issue (referred to them in a question or chose voluntarily to relate to this aspect).

PA enjoyed the Visual part of the lesson, although the other elements slightly annoyed him, such as the teacher's voice or copying from the screen that took time, or he was bored by the Kinaesthetic element, while HM enjoyed the Kinaesthetic part.

Summary of the Findings for the R Group

Despite the small size of the group, nevertheless the words of the three pupils can be summarised. This group felt they were helped by all the elements in the lesson (V, A, R and K) during the experimental lesson. Like the VARK group this group also felt that the Visual element was the most influential with a reservation by HL that one component of the Visual element, the surplus of pictures hindered her. Here too the expressions of hindrance were insignificant constituting only 10% of all the expressions and relating to the Kinaesthetic aspect.

Observation of the expressions of hindrance by one component of the elements (V, A, R or K) reveals that the teacher's Auditory explanations (element A) were felt to be the most significant hindrance, when the teacher stopped the screening of the presentation and explained matters orally to the pupils. Only 1 expression indicated hindrance due to the loud voices in the presentation.

The Visual element was felt to be the most significant in assisting the pupils to concentrate and listen, nevertheless there was a reservation concerning one component of the Visual element – which was felt to be too onerous, for example: *'the large amount of pictures hindered me*'. Additionally this element gave pleasure – 1 expression, helped to understand the studied subject matter – 2 expressions, awakened interest and simplified the subject matter – 1 expression.

They felt the Auditory element mainly experienced assisted them to understand the subject matter, by helping them to concentrate and listen – 2 expression, with a reservation regarding the teacher's oral explanations, and also helped to master and remember the subject matter – 2 expressions and caused pleasure – 1 expression with a reservation concerning the teacher's oral explanations.

They felt the Reading/writing element was beneficial, mainly helping them to understand the subject matter – 2 expressions, helping to master and remember the subject matter – 1 expression, attracting attention and helping to awaken interest – 1 expression.

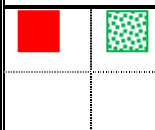
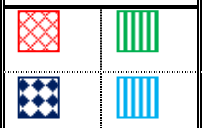
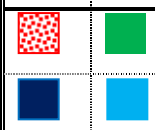
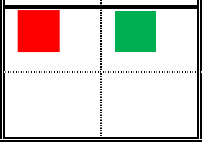
The Kinaesthetic activity was mainly felt to be helpful, helping the pupils to concentrate and listen – 2 expressions. Several pupils felt that it contributed to their understanding of the subject matter, to their mastery and remembering of the subject matter, and was pleasurable – each supported by 1 expression.

The pupils diagnosed with an R learning style did indeed feel that they were assisted in the experimental lesson by all the different teaching styles especially the Visual element, and experienced a hindrance due to the teacher's oral explanations.

Findings for Two Pupils who were diagnosed as having an A Learning Style

These findings are presented with a certain reservation regarding the size of the group

Table 5.12:
Analysis of Expressions of Two Pupils diagnosed as having an A Learning Style

Pupil's name	Criteria						
	Assisted concentration and listening /attention	Assisted subject matter comprehension	Helped to master the subject matter and remember it	Attracted attention and helped to awaken interest	Assisted in simplifying the subject matter	Helped to strengthen confidence and self-checking	Gave pleasure
FE							
JP							

Analysis of the findings from the interviews for 2 pupils diagnosed with A learning style (see Table 5.12 above)

From Table 5.12 above it is clear that both the pupils in the A group related in their interviews to all the lesson elements: Visual, Auditory, Reading/writing and Kinaesthetic, since in each pupil's row there appear all four colours signifying these learning styles (red, green, blue and turquoise, even if these cubes are not filled).

Analysis of these interview findings shows that the pupils diagnosed with an A learning style felt that they were helped by the V, A, R and K elements of the lesson as detailed below:

V – 4 filled red cubes indicate that they were helped by the Visual element of the lesson

A – 2 filled green cubes indicate that they were helped by the Auditory element of the lesson.

R – 2 filled blue cubes indicate that they were helped by the Reading/writing element of the lesson.

K – 1 filled turquoise cube indicated help from the Kinaesthetic element of the lesson.

Analysis of the interview findings shows that the pupils diagnosed as having an A learning style felt that they were hindered in their learning process by the V, A, R and K elements of the lesson as follows:

Analysis of the partially shaded cubes:

It is noted that there are no cubes indicating a lack of assistance (cubes with a coloured frame and a letter indicating the learning style within).

Examining the partially shaded cubes (indicating interference, an unnecessary element, an unhelpful element or a boring element) these cubes show that although a certain element of the lesson helped the pupil to learn, some component of the element was unhelpful, for example the claim that the Visual element was helpful but one of its components, the coloured emphases, hindered learning.

There are:

2 partially shaded red cubes for the Visual element.

2 partially shaded green cubes for the Auditory element.

2 partially shaded blue cubes for the Reading/writing element.

2 partially shaded turquoise cubes for the Kinaesthetic element.

A closer look at the data shows that the hindrance expressed in relation to the Auditory element only related to the loud sounds in the presentation and **the teacher's words which hindered comprehension of the subject matter**. 1 girl spoke about a particular component of the Visual element that hindered her, an excess of pictures and FE felt that the animations hindered him apart from these remarks there were no expressions regarding hindrances by the Visual element.

Which of the Elements (V, A, R and/or K) that appeared in the Lesson, were perceived by the Pupils diagnosed with A Learning Style as <u>assisting concentration and listening?</u>

Examination of the column 'assisting subject matter comprehension' in Table 5.12 reveals that all the pupils in this group related to this issue.

2 pupils related to the Visual element and felt that it helped them to concentrate and listen (there are one filled red cube and one empty red cube in the column entitled 'assisted concentration and listening'). With the reservation that the pictures were unnecessary it seems that the pupils from the A group were assisted to concentrate and listen by the Visual element of the presentation.

Both pupils in group A related to the Auditory element, FE felt that the voices in the presentation hindered him while JP felt that the voices helped him to concentrate. We see here that even if both pupils had the A learning style, nevertheless the voices in the presentation hindered FE who in response to the question: *'did the voices in the presentation help you?'* answered *'they didn't help because of the pictures I concentrated on the presentation'*.

Just 1 pupil, JP from the A group related to the Reading/writing element, she felt that it helped her to concentrate and listen. Again only JP from the A group related to the Kinaesthetic element and felt that this element helped her to concentrate and listen.

Which of the Elements (V, A, R and/or K) that appeared in the Lesson, were perceived by the Pupils diagnosed with A Learning Style as <u>assisting subject matter comprehension?</u>

Examination of the column 'assisting subject matter comprehension' in Table 5.12 above reveals that both the pupils in this group related to this issue.

Table 5.12 shows that FE felt a partial hindrance by all the elements: the animations hindered him in the Visual part of the lesson, the teacher's oral explanations hindered him in the Auditory part of the lesson, it hindered him when he was asked to read out loud before the class and when he already had command of the subject matter it seemed unnecessary to him to participate in Kinaesthetic work. FE is a strict example of Auditory learning style, since he felt that he was hindered by all the other elements of the lesson (V, R and K). The

difficulty he encountered in reading out loud from the presentation may be due to additional factors, such as embarrassment in front of the teacher and other pupils.

JP, the other pupil in this group related to two elements (V and A) and felt that these elements helped her to understand the subject matter.

Which of the Elements (V, A, R and/or K) that appeared in the Lesson, were perceived by the Pupils diagnosed with A Learning Style as helping to master and remember the subject matter ?

Examination of the column 'helping to master and remember the subject matter' in Table 5.12 above reveals that all the pupils in this group related to this issue.

Apart from FE who related to this issue with regard to the Kinaesthetic element and felt that when he already understood the subject material it was unnecessary to work in the exercise book, JP did not relate to this issue but it seems that she enjoyed the Visual element and did not like to write things down when she had already understood the subject matter.

It is interesting to see that both pupils repeated the same thing regarding the repetition of subject matter that they had already understood, it seemed unnecessary to them to again work on the subject matter, whether through the teacher's explanations as FE remarked or by working in the exercise book. It seems that they were helped by the different elements until them understood the subject matter and once they had understood they felt that any additional work was a waste of time and they became apathetic.

Summary of the Findings for the A Group

Despite the small size of this group, it is possible to summarise the words of the two pupils. These pupils felt that they were assisted by all the elements (V, A, R and K) employed in the experimental lesson, like the previously discussed groups they felt that the Visual element was most influential with the reservation by JP that too many pictures (a component of the V element) hindered him, and the reservation of FE that animation was felt to be superfluous (a component of

the V element). This group did not express hindrance in relation to any of the elements.

Examination of expressions of hindrance in relation to one of the components of the V, A, R or K elements shows that the most significant hindrance was felt as a result of the Kinaesthetic element, when the subject matter was already previously understood – 2 expressions by FE.

The Visual element was felt to be most influential in assisting the pupils to concentrate, listen and understand the subject matter – 2 expressions by both pupils. Nevertheless there were 2 reservations regarding a component of the Visual element, for example: *'too many pictures hindered me'* and the animations were also felt to interfere. The Visual element was also considered pleasurable – 1 expression, and attracted attention – 1 expression.

They felt that the Auditory element was especially helpful to understand the subject matter, to concentrate and listen – 2 expressions, with a reservation concerning the teacher's oral explanations, and concerning loud voices in the presentation – 1 expression.

They felt that the Reading/writing element helped them to understand, concentrate and listen to the subject matter and gave pleasure – 1 expression for each of these criteria.

They felt that the Kinaesthetic element helped them especially to concentrate and listen, to understand and master the studied subject matter, 1 expression for each of these criteria. It was noticeable that when they had already understood the subject matter from the presentation they felt that the Kinaesthetic element was unnecessary.

The members of the A group felt they were assisted by all the elements in the experimental lesson but most significantly helped by the Visual element, sensing a hindrance when they felt that an element was employed after they had understood the subject matter.

Findings for 2 pupils diagnosed as having a Kinaesthetic Learning Style

These findings are presented in Table 5.13 below with a certain reservation regarding the size of the group.

Table 5.13: Analysis of expressions by 2 pupils diagnosed as having a K Learning Style

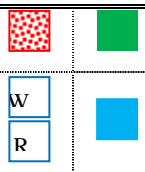
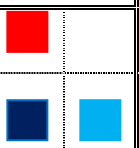
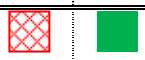
Pupil's name	Criteria						
	Assisted concentration and listening /attention	Assisted subject matter comprehension	Helped to master the subject matter and remember it	Attracted attention and helped to awaken interest	Assisted in simplifying the subject matter	Helped to strengthen confidence and self-checking	Gave pleasure
FD							
							
EX							
							

Table 5.13 above shows that each of the pupils with a K learning style related to all the elements in the lesson (Visual, Auditory, Reading/writing and Kinaesthetic), this can be seen since in each pupil's row there appear cubes of all four colours (red, green, blue and turquoise) symbolising the four learning styles.

Analysis of these findings shows that the pupils diagnosed with a Kinaesthetic learning style felt that they were assisted during the learning process by the V, A, R and K elements as detailed below.

V – 3 filled red cubes indicated that 3 pupils were assisted by the Visual element of the lesson.

A –2 filled green cubes indicated that 2 pupils were assisted by the Auditory element of the lesson.

R – 3 filled blue cubes indicated that 3 pupils were assisted by the Reading/writing element of the lesson.

K – 3 filled turquoise cubes indicated that 3 pupils were assisted by the Kinaesthetic element of the lesson.

Analysis of the interview findings shows that the pupils diagnosed with a Kinaesthetic learning style were hindered in their learning by the V, AS, R and K elements as follows:

According to the empty cubes:

Table 5.13 above shows 2 cubes which express a lack of assistance (with a coloured frame and a letter inside) and it can be seen that FD felt that he was hindered by the Reading/writing element.

Analysis of the partially shaded cubes (indicating interference, an unnecessary component, a component that did not help, or a boring component, shows that although the element itself helped the pupil to learn one component of the element hindered the pupil.

2 partially shaded red cubes relating to the Visual element

0 partially shaded green cubes relating to the Auditory element

1 partially shaded blue cube relating to the Reading/writing element

1 partially shaded turquoise cube relating to the Kinaesthetic element

One pupil, FD, felt that he was hindered by the excess pictures in the Visual part of the lesson and also when he had already understood the subject matter the Kinaesthetic part of the lesson seemed unnecessary to him. The same pupil also suffered when he had to read out loud in front of the class. EX was only hindered by the animations in the Visual part.

Which of the Elements (V, A, R and/or K) that appeared in the Lesson, were perceived by the Pupils diagnosed with K Learning Style as <u>assisting concentration and listening?</u>

Study of the column 'assisted concentration and listening' in Table 5.13 above reveals that all the pupils in this group related to this issue.

2 pupils related to the Visual element, they felt it helped them to concentrate and listen, but with a reservation, FD was hindered by too many pictures and EX was hindered by the animations (indicated by 2 partially shaded cubes).

With these reservations it seems that members of the K group felt they were helped to concentrate and listen by the Visual elements of the presentation.

Pupils in the K group felt that the Auditory element helped them to concentrate and listen (2 filled green cubes). FD was hindered by the Reading/writing element of the presentation while EX was helped by the Reading/writing part of the lesson to concentrate and listen. It is clear that both pupils considered that the Kinaesthetic element helped them to concentrate and listen.

Which of the Elements (V, A, R and/or K) that appeared in the Lesson, were perceived by the Pupils diagnosed with K Learning Style as <u>assisting subject matter comprehension?</u>

Study of the column 'assisted subject matter comprehension' in Table 5.13 reveals that FD perversely felt that the Kinaesthetic element hindered him: *'it usually helped but when I had mastered the subject matter it was unnecessary'*. The Reading/writing helped him to understand the subject matter although it hindered him from concentrating and listening. It is interesting to see that a particular element hindered him from concentrating and listening yet it helped him to understand, this justifies the use of separate criteria to examine these issues. Since there was a contradiction between the findings concerning FD's feelings on this issue, the researcher re-examined the interview transcripts and found that FD had responded in answer to a question about hindrance: *'sometimes it was really enough (learning with the presentation) and the work in the exercise book was slightly unnecessary, but I think that the work in the exercise book helped me to concentrate and also to revise the subject matter.*' FD studied in the class with the presentation and understood the subject matter but he also knew that it was important to revise the subject matter in order to master it.

Which of the Elements (V, A, R and/or K) that appeared in the Lesson, were perceived by the Pupils diagnosed with K Learning Style as <u>helping to master and remember the subject matter?</u>

Study of the column 'helped to master and remember the subject matter' in Table 5.13 above reveals that FD was helped by the Visual, Reading/writing and Kinaesthetic elements, to master and remember the subject matter. FD

enjoyed the Visual element although he had an unpleasant experience when reading out loud before the class. EX felt that the Visual element attracted his attention and helped to awaken his interest in the studied subject matter.

Which of the Elements (V, A, R and/or K) that appeared in the Lesson, were perceived by the Pupils diagnosed with K Learning Style as caused pleasure?

Study of the column 'gave pleasure' in Table 5.13 shows that of the two pupils with a K learning style, FD reported that he felt that the Visual part of the lesson was pleasurable, as was the writing part of the lesson but he had reservations concerning reading out loud in front of the class, FD is a new immigrant from Russia and this may have been the reason for his difficulty when he had to read out loud before the class.

Summary for Group K

Despite the small size of the group, their views can be summarised. This group felt they were helped by all the elements of the experimental lesson (V, A, R and K). Like the other groups mentioned above they felt they were most helped by the Visual element with FD's reservation that too many pictures (a component of the Visual element) hindered him, and EX's reservation that the animations (also a component of the Visual element) were unnecessary. FD also felt that the reading component of the Reading/writing element hindered his concentration and listening.

Examination of the expressions relating to interference by one component of one of the elements (V, A, R or K) shows that the most significant hindrance stemmed from a component of the Reading/writing element that hindered FD's learning.

The Visual element was felt to be most significant for these pupils helping them to concentrate and listen (2 expressions by both pupils) nevertheless there were 2 reservations regarding components of the Visual element, for example *'too many pictures hindered me'*. The animations were also a hindrance although the Visual element also caused pleasure (1 expression) and helped to attract attention (1 expression) and to master and remember the subject matter (1 expression).

They felt that the Auditory element helped them to understand the subject matter, to concentrate and listen (2 expressions). They also felt that the Reading/writing element helped them to concentrate and listen, to understand and master the subject matter and gave them pleasure (1 expression for each of these criteria) with the reservation of FD regarding the request that he read out aloud before the class. They mainly felt that the Kinaesthetic activity helped them to concentrate and listen (2 expressions), and to understand and master the subject matter (1 expression for each of these criteria).

It is noticed that when FD already understood the subject matter from the lesson from the presentation he felt that the Kinaesthetic work was unnecessary for him.

The pupils diagnosed as having a K learning style were indeed helped by the lesson that combined the four different teaching styles, especially by the Visual element, though they felt they were hindered when asked to do additional work on the subject matter after they had understood it.

Findings for Pupils who were diagnosed with VK, VAR or VAK Learning Styles

Three additional pupils did not belong to a particular group but they had one common element in their diagnosed learning styles – the Visual element. Two of them also had the Auditory element in common in their learning style and two of them had the Kinaesthetic element in common.

Since these pupils had unique learning styles they were not really a group but the researcher decided to consider the findings for these pupils as a 'group with unique learning styles' since at least one element of their styles was the same – the Visual element although there are variations between them. Tables 5.14, 5.15 and 5.16 below display the findings for these three pupils with unique learning styles. Consideration for these data is given separately for each pupil.

Table 5.14: Analysis of expressions by 1 pupil diagnosed as having a VAK Learning Style

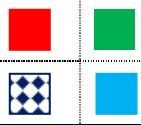
Pupil's name	Criteria						
	Assisted concentration and listening	Assisted subject matter comprehension	Helped to master the subject matter and remember it	Attracted attention and helped to awaken interest	Assisted in simplifying the subject matter	Helped to strengthen confidence and self-checking	Gave pleasure
HK							

Table 5.15: Analysis of expressions by 1 pupil diagnosed as having a VK Learning Style

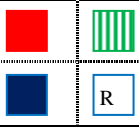
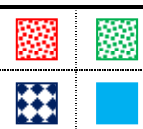
Pupil's name	Criteria						
	Assisted concentration and listening	Assisted subject matter comprehension	Helped to master the subject matter and remember it	Attracted attention and helped to awaken interest	Assisted in simplifying the subject matter	Helped to strengthen confidence and self-checking	Gave pleasure
GH							

Table 5.16: Analysis of expressions by 1 pupil diagnosed as having a VAR Learning Style

Pupil's name	Criteria						
	Assisted concentration and listening	Assisted subject matter comprehension	Helped to master the subject matter and remember it	Attracted attention and helped to awaken interest	Assisted in simplifying the subject matter	Helped to strengthen confidence and self-checking	Gave pleasure
HN							

Analysis of Interview Data gathered from 3 pupils with VK, VAR or VAK learning styles displayed in Tables 5.15, 5.16 and 5.17 above

Tables 5.14, 5.15 and 5.16show that all the pupils related in their interviews to all the lesson components (V, A, R and K). In each pupil's row all four colours symbolising these elements appear (red, green, blue and turquoise, even if the cubes are not filled) (when the subject was referred to them in a question or they chose voluntarily to relate to this aspect).

Analysis of these interview findings indicates that the pupils with a VK, VAK or VAR learning style felt that their learning process was assisted by the different elements of the lesson (V, A, R and K) as follows:

V - 7 filled red cubes indicated that they were assisted by the Visual element of the lesson

A - 6 filled green cubes indicated that they were assisted by the Auditory element of the lesson

R - 4 filled blue cubes indicated that they were assisted by the Reading/writing element of the lesson

K - 4 filled turquoise cubes indicated that they were assisted by the Kinaesthetic element of the lesson

Analysis of the interview findings shown in Tables 5.14, 5.15 and 5.16 above indicates that the pupils in the VK, VAR and VAK group reported that they were hindered in the experimental lessons by the V, A, R or K elements as follows:

According to the empty cubes:

Two cubes indicate a lack of assistance (cubes with a coloured frame and a letter inside). It is seen that GH reported a hindrance to his learning from the Reading/writing element.

According to the partially filled cubes (indicating an interference, unnecessary component, component that did not help, or boring component, indicating that although the element itself was helpful some component constituted a hindrance):

2 partially filled red cubes related to the Visual element

2 partially filled green cubes related to the Auditory element

2 partially filled blue cubes related to the Reading/writing element

0 partially filled turquoise cubes related to the Kinaesthetic element

this stemmed from remarks of one pupil HN (VAR style) who twice noted that felt hindered by components of the Visual element.33% of the expressions related the Reading/writing element, this stemmed from remarks by 2 pupils who were hindered when they had to read out loud before the class and 33% of the expressions related to the Auditory element of the lesson. GH (VK style) complained about the teacher's oral explanation, while HN (VAR style) complained about the voices in the presentation.

Which of the Elements (V, A, R and/or K) that appeared in the Lesson, were perceived by the Pupils diagnosed with VK, VAR or VAK Learning Style as <u>assisting concentration and listening?</u>

Study of the column 'assisted concentration and listening' in Tables 5.14, 5.15 and 5.16 reveals that all the pupils in this group related to this issue.

All three pupils related to the Visual element which they felt helped them to concentrate and listen, but with a reservation by HN (VAR) that too many pictures hindered him. With this reservation the pupils in the VK, VAK and VAR group felted that the Visual element of the presentation helped them to concentrate and listen.

This group also related to the Auditory element and felt that it helped them to concentrate and listen (one filled green cube) although GH (VK) and HN (VAR) sensed a hindrance from one component of the Auditory element. Although GH said he was assisted by the Auditory element to concentrate and listen, he noted that the teacher's oral explanations hindered him. HN also indicated that the Auditory element helped him to concentrate and listen but the voices in the presentation bothered him.

GH (VK) was helped by the Reading/writing element to concentrate and listen, although the other two members of this group – HK (VAK) and HN (VAR) felt that reading out loud before the class hindered their concentration and listening. Both these pupils were helped to concentrate and listen by the Kinaesthetic

element of the lesson, even though the learning style of HN (VAR) does not include the Kinaesthetic element, but GH felt that this element hindered his concentration and listening.

Which of the Elements (V, A, R and/or K) that appeared in the Lesson, were perceived by the Pupils diagnosed with VK, VAR or VAK Learning Style as <u>assisting subject matter comprehension?</u>

Study of the column 'assisted subject matter comprehension' in Table 5.14, 5.15 and 5.16 reveals that all the pupils in this group related to this issue.

The three pupils in this group reported that their understanding of the subject matter was assisted by the Visual element of the lesson, with the reservation by HN (VAR) that he was hindered by the pictures in the presentation.

Two pupils, HK (VAK) and GH (VK) reported that they were assisted to understand the subject matter by the Auditory element of the lesson; HK said that he was helped to understand the subject matter by the Reading/writing element while the other two members of the group said they were helped to understand by the Kinaesthetic element.

It is noted that GH (VK) reported that he was helped to understand by the Auditory element, although he had said that the teacher's voice hindered his concentration and listening.

Which of the Elements (V, A, R and/or K) that appeared in the Lesson, were perceived by the Pupils diagnosed with VK, VAK or VAR Learning Style as <u>helping to master and remember the subject matter?</u>

Study of the column 'helped to master and remember the subject matter' in Table 5.16 reveals that HN reported that he was helped to master and remember the subject matter by the Auditory element.

Which of the Elements (V, A, R and/or K) that appeared in the Lesson, were perceived by the Pupils diagnosed with VK, VAK or VAR Learning Style as <u>giving pleasure?</u>

Study of the column 'gave pleasure' in Table 5.16 reveals that HN (VAR) reported an experience of pleasure due to three of the elements (V, A and R) while GH (VK) reported experiencing pleasure due to the Visual element of the lesson, but did not like copying things from the presentation in writing.

HK (VAK) reported that the Reading/writing element strengthened his confidence and self-examination and also reported that the Auditory element attracted his attention and awakened his interest.

GH (VK) reported that the Visual element attracted his attention and awakened interest.

<u>Summary for the VK, VAK and VAR Group</u>

Despite the group's small size the following summary can be made: This group was helped by all the elements of the experimental lesson (V, A, R and K). They felt most helped by the Visual element but also by the Auditory element. Here, as in the other group, there was an insignificant percentage of expressions of hindrance (7% of all expressions). It is noted that GH (VK) felt that the Reading/writing element hindered him; this corresponds with the fact that he has no Reading/writing element in his learning style.

When examining the hindrances caused by a single component of one of the elements, it is seen that the most significant hindrance was experienced by HN (VAR) who was hindered by one component of the Kinaesthetic element.

The Visual element was the most significant for the pupils in this group helping them to concentrate and listen and to understand the studied subject nevertheless there was one reservation regarding a component of this element: *'too many pictures hindered me'*. The Visual element was also considered pleasurable – 2 expressions by GH and HN, and attracting attention 1 expression.

The Auditory element was mainly experienced as helping to understand the subject matter and to concentrate and listen (5 expressions) with a reservation concerning the teacher's oral explanations by GH, and regarding the loud voices in the presentation by HN. It was also felt to help to master and remember the subject matter (1 expression by HN) and caused pleasure (1 expression by HN) and attracted HK's attention, awakening his interest.

The group felt that the Reading/writing element mainly helped to concentrate and listen and to understand the subject matter (2 expressions for each criterion).

They also mainly felt that the Kinaesthetic element helped them to concentrate and listen (3 expressions) with the reservation that if they had already understood the subject matter, this activity seemed unnecessary. HK felt that this activity also helped him to master and remember the subject matter, while HN (VAR) felt that it was pleasurable although HN did not have the Kinaesthetic element in his learning style.

APPENDIX 5.5: ANALYSIS OF INTERVIEW DATA AT STAGE G

Table 5.17 - Complete: Analysis of Interview Expressions indicating Assistance for Learning from the Experimental Lesson by Categories of Motivation

(Table is divided into sub-tables for each pupil)

Key for tables

V – Visual element,
A – Auditory element,
a – Auditory element (teacher's oral explanations,
R – Reading/writing element,
K – Kinaesthetic element

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting a sense of belonging, autonomy, competence, efficacy, relatedness, external motivation or internal motivation	Expressions reflecting assistance from the discussed element
HM: R	V	Sense of autonomy Sense of efficacy Sense of autonomy	*'They attracted attention, I concentrated more.* *Emphasising of the words with colours showed us how to remember and understand better.* *The funny pictures attracted attention.'*
	A	Sense of autonomy, internal motivation.	*'They attracted attention.'*
	R	Sense of efficacy	*'They helped me very much to understand the subject matter. . I felt that it was easier to write, because I really understood, I shall certainly remember the rules better.'*
	a	Sense of relatedness, testifying to a need for a relationship with teachers and parents Sense of efficacy Feeling of autonomy	*'We're used to hearing explanations from the teacher;* *I went over it by heart and understood it better. .* *I noticed things that I hadn't paid attention to during the presentation.*

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting a sense of belonging, autonomy, competence, efficacy, relatedness, external motivation or internal motivation	Expressions reflecting assistance from the discussed element
		Sense of efficacy	*When there are examples it's easier for me to understand and remember the subject matter.'*
	K	Sense of autonomy, internal motivation Sense of efficacy Sense of relatedness	*'It's fun, it helps me to concentrate on the subject matter.* *Again we focus on the material and it helps us to understand.* *My mother also says it's important to do exercises.'*

HM (R)

Consideration of V, R and a: Testified that this granted her/ built her/ gave her a sense of efficacy: *'I concentrated more', 'to remember and understand better', 'I felt it was easy for me', ' I really understood' 'I'll remember better', 'its easy for me to understand and remember'.*

Consideration of A, V and K testified to internal motivation: 'attracted attention', 'fun'.

a: testified to the need for a connection with the teacher and parents: *'We're used to hearing explanations from the teacher', 'understood it better', 'I noticed things that I hadn't paid attention to', 'the examples helped', 'my mother also says its important to do exercises'.*

HM's expressions testified to a sense of efficacy, a sense of relatedness and internal motivation.

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting a sense of belonging, autonomy, competence, efficacy, relatedness, external motivation or internal motivation	Expressions reflecting assistance from the discussed element
EY: VARK	V	sense of autonomy	*'They make everyone be quiet and concentrate on the subject matter.'*
	A	sense of autonomy	*'They make everyone be quiet and concentrate on the subject matter.'*
	R	sense of efficacy	*'I think it helped me.'*
	a	sense of relatedness sense of relatedness	*'I understood things better when the teacher explained. It's important to hear the teacher's explanations.'*
	K	sense of efficacy external motivation external motivation	*'If I'm given enough time it helps me.* *I think it's beneficial.* *The exercise is important and it also helps.'*

<u>EY (VARK)</u>

Consideration of V and A testify to the relationship with (relatedness to) other children (peers) *'make everyone be quiet and concentrate on the subject matter.'*

Consideration of a – indicates the need for relationship with teacher (teacher relatedness) and sense of efficacy when the teacher is in the vicinity, *'its important to hear the teacher's explanations.' 'I understood better when the teacher explained.'*

It is clear that EY has a need for a sense of relatedness and a sense of efficacy dependent on his sense of relatedness

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting a sense of belonging, autonomy, competence, efficacy, relatedness, external motivation or internal motivation	Expressions reflecting assistance from the discussed element
FD: K	V	sense of autonomy internal motivation sense of efficacy	*'The animation was interesting and sometimes funny. It helped me to remember things.'* *'It was interesting.'* *'Funny animation.'*
	A	sense of efficacy	*'They helped me to concentrate.'*
	a	sense of efficacy sense of relatedness	*'They helped me to concentrate.'* *'To remember the subject matter.'*
	R	sense of efficacy	*'The subject matter is easy for me, and I understand what is wanted from me.'*
	K	sense of relatedness sense of efficacy	*'The exercises in the book are important.'* *'The work in the exercise book helped me.'* *'The work in the exercise book helped me to concentrate.'* *'It helps me to remember the subject matter.'*

<u>FD (K)</u>

Consideration of V indicates internal motivation: *'it was interesting', 'funny'.*

Consideration of V, A, R and K indicate a sense of efficacy: *'helped me to remember', 'helped me to concentrate', 'the subject matter is easy for me', 'I understand', 'the work in the exercise book helped me.'*

Expressions emerged that testify to internal motivation and a sense of efficacy.

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting a sense of belonging, autonomy, competence, efficacy, relatedness, external motivation or internal motivation	Expressions reflecting assistance from the discussed element
FZ: VARK	V	internal motivation sense of autonomy sense of efficacy internal motivation	*'It was interesting.'* *'I liked it.'* *'I listened and looked.'* *'It's easier to learn.'* *'I'm focused and concentrate.'*
	A	internal motivation	*'I concentrated.'*
	a	sense of efficacy sense of relatedness	*'That I understand better.'*
	R	sense of efficacy	*'It helped me to understand the subject matter better.'*
	K	sense of efficacy	*'It was easy to solve the exercise book after the presentation.'* *'It helped me to concentrate.'* *'It helps, it's easy, strengthens my confidence because I understand it all.'*

FZ (VARK)

Consideration of V indicates internal motivation: *'it was interesting', 'I liked it', 'I'm focused and concentrate.'*

Consideration of V, a, R and K testify to a sense of efficacy: *'its easy' 'understand better' 'helped me to concentrate', 'strengthens my confidence.'*

Expressions emerged that testify to internal motivation and a sense of efficacy.

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting a sense of belonging, autonomy, competence, efficacy, relatedness external motivation or internal motivation	Expressions reflecting assistance from the discussed element
JQ: VARK	V	sense of efficacy	*'The emphases helped.'*
	A	sense of autonomy	*'The voices in the presentation helped me to concentrate, they attracted my attention.'*
	a	sense of efficacy sense of relatedness	*'It helped me to learn.'*
	R	sense of efficacy	*'They helped, so that I feel that I understand.'*
	K	sense of efficacy sense of relatedness	*'It contributed something additional, important.'*

JQ (VARK)

Consideration of V and A indicate autonomy: the emphases and the voices were important for him. He explains preferences that helped him. He also indicates a sense of efficacy: *'helped me to concentrate', 'I feel that I understand'.*

Expressions emerged that testify to autonomy and a sense of efficacy.

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting a sense of belonging, autonomy, competence, efficacy, relatedness, external motivation or internal motivation	Expressions reflecting assistance from the discussed element
GH: VK	V	internal motivation sense of efficacy sense of autonomy sense of autonomy internal motivation sense of efficacy	*'They were funny and interesting. They helped me to look and listen.'* *'To become interested in it.'* *'I really did concentrate.'* *'Succeeded very well.'* *'It's fun.'* *'It helped a lot.'*
	A		
	a	sense of efficacy	*'They helped me to understand better.'*
	R	sense of efficacy	*'It didn't hinder me, it helped me.'*
	K	sense of relatedness	*'Certainly important, you have to exercise in the book.'*

GH (VK)

Consideration of V testifies to internal motivation: *'its fun' 'interesting'* and autonomy *'they were funny and interesting', 'succeeded very well'*

Consideration of a indicates that has no a need for relationship with the teacher.

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting a sense of belonging, autonomy, competence, efficacy, relatedness, external motivation or internal motivation	Expressions reflecting assistance from the discussed element
HN: VAR	V	internal motivation	*'They were funny, the pictures were pretty, it was fun to learn.'* *'It highlights important things and helps to understand the subject matter.'*
	A		
	a	sense of efficacy	*'They actually helped.'*
	R	sense of efficacy	*'They helped.'* *It's important it coordinates the material.'*
	K	sense of efficacy	*'I concentrate and understand the subject matter, it's not unnecessary.'*

HN (VAR

Consideration of V indicates internal motivation.

Consideration of a, R and K testify to a sense of efficacy.

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting a sense of belonging, autonomy, competence, efficacy, relatedness, external motivation or internal motivation	Expressions reflecting assistance from the discussed element
HK: VAK	V	sense of efficacy	*'They helped me to absorb and understand the subject matter I think they helped.'*
	A	sense of autonomy ,internal motivation sense of efficacy	*'They drew attention and helped me to understand what they explained.'*
	a	sense of efficacy	*'I absorbed it better when the teacher also explained.'*
	R	sense of efficacy	*'It really helped me to understand. It gave me confidence that I understood.'*
	K	sense of efficacy	*'It helped me to focus on the subject matter.'*

HK (VAK)

Consideration of V, A, a, R and K all indicate a sense of efficacy.

Consideration of A: *'drew attention'* testifies to autonomy and internal motivation.

Consideration of a: testifies to need for teacher relatedness.

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting a sense of belonging, autonomy, competence, relatedness external motivation or internal motivation	Expressions reflecting assistance from the discussed element
JP: A	V	internal motivation , sense of efficacy	*'I enjoyed it, it's easier to learn, it helped me to concentrate.'*
	A	sense of efficacy	*'It helped me.'*
	a	sense of efficacy	*'They helped me, they weren't superfluous, they helped me to understand.'*
	R	sense of efficacy	*'They helped me to concentrate; I felt that they helped me to assimilate the subject matter.'*
	K	sense of efficacy	*'Helped me a lot.'*

JP (A)

Consideration of V testifies to sense of efficacy: *'its easier for me'* and also internal motivation: *'I enjoyed it'.*

Consideration of A R, and K testified to a sense of efficacy

Consideration of a: indicates the relationship with the teacher is not sufficiently meaningful.

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting a sense of belonging, autonomy, competence, efficacy, relatedness, external motivation or internal motivation	Expressions reflecting assistance from the discussed element
EX: K	V	sense of efficacy internal motivation	*'It helped, more interesting.'*
	A	sense of efficacy	*'It helped to concentrate on the subject matter.'*
	a	sense of efficacy external motivation	*'It was important, that was how we knew what to pay attention to. . I understood well.'*
	R	sense of efficacy	*'It helped; I was actually focussed on the subject matter.'*
	K	sense of efficacy	*'It helped me to focus.'*

EX (K)

Consideration of V, A, R and K indicate a sense of efficacy: *'helped'* .Internal motivation: 'more interesting'

Consideration of a: indicates the relationship with the teacher is important and testifies to external motivation *'that was how we knew what to pay attention to.'*

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting a sense of belonging, autonomy, competence, efficacy, relatedness, external motivation or internal motivation	Expressions reflecting assistance from the discussed element
FB: VARK	V	sense of efficacy internal motivation	*'I liked this most, it was easy to learn.'*
	A	sense of efficacy	*'They helped me to concentrate.'*
	a	sense of relatedness	*'They helped me and also checked whether I understood.'*
	R	sense of efficacy	*'It helped me, didn't interfere.'*
	K	sense of efficacy sense of autonomy	*'They helped me to focus, they were not necessary once I understood the subject matter.'*

FB (VARK)

Consideration of V and R shows sense of efficacy and internal motivation.

Consideration of A shows sense of efficacy.

Consideration of a indicates sense of relatedness, he thinks it important that the teacher checks if he understands and also helps him, attesting to a sense of efficacy.

Consideration of K testifies to a clear sense of autonomy. The fact that he thinks it *'not necessary'* expresses his preference.

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting a sense of belonging, autonomy, competence, efficacy, relatedness, external motivation or internal motivation	Expressions reflecting assistance from the discussed element
PA: R	V	sense of efficacy internal motivation	*'I liked them, they were fun, they really helped me to absorb the subject matter, it was easy for me to understand and learn, they certainly helped me.'*
	A	sense of efficacy	*'They helped me.'*
	a		
	R	sense of efficacy	*'It helped me to focus.'*
	K		

PA (R)

Consideration of V, A and R indicate a sense of efficacy.

Consideration of V indicates a proper internal motivation (all the expressions here).

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting a sense of belonging, autonomy, competence, efficacy, relatedness, external motivation or internal motivation	Expressions reflecting assistance from the discussed element
FC: VARK	V	sense of efficacy	*'They helped me.'*
	A		
	a	sense of efficacy	*'I absorbed the subject matter better, the explanations helped me understand.'*
	R	sense of efficacy	*'It helped me, it also helped me.'*
	K	sense of efficacy	*'They helped me, when you write you remember better what is written.'*

FC (VARK)

The expressions testify to a sense of efficacy.
The explanations helped him *'I absorbed the subject matter better', 'helped me to remember', 'when you write you remember better'.*

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting a sense of belonging, autonomy, competence, efficacy, relatedness, external motivation or internal motivation	Expressions reflecting assistance from the discussed element
HL: R	V	sense of efficacy	*'They did not bother me, the colours helped me, the pictures helped me the most.'*
	A		
	a		*'They did not hinder me.'*
	R	sense of efficacy	*'It helps me to understand the subject matter.'*
	K	sense of efficacy	*'It helps a lot to focus on the subject matter; you have to work in the exercise book.'*

HL (R)

Consideration of V, R and K indicate a sense of efficacy*: 'the pictures helped me', 'it helps a lot to focus', 'it helps me to understand'.*

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting a sense of belonging, autonomy, competence, efficacy, relatedness, external motivation or internal motivation	Expressions reflecting assistance from the discussed element
GJ: VARK	V	sense of efficacy internal motivation sense of efficacy sense of autonomy ,internal motivation	*'It helped me a lot, didn't bother me at all',* *' I liked it, it was more interesting and easy to learn, they helped, they helped me to concentrate and learn, it was fun.'*
	A		
	a	sense of efficacy sense of relatedness	*'I succeeded in learning better; it helped me to understand the subject matter. They were important and didn't disturb me in the middle.'*
	R	sense of efficacy	*'It helped me to understand.'*
	K	sense of efficacy	*'It helped me to focus, it was good, you have to exercise in the exercise book in order to understand, you always have to do exercises.'*

<u>GJ (VARK)</u>

Consideration of V, A, R and K indicates a sense of efficacy: *'helped', 'didn't bother me', 'easy', 'it helped', 'to understand' 'it helped me to focus'.*

Expressions indicating internal motivation: *'it was good', 'I liked it' 'more interesting' 'it was fun'* and a sense of autonomy: *'more interesting'.*

Consideration of a: shows a sense of relatedness: *'I succeeded in learning better', 'it helped me'.*

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting a sense of belonging, autonomy, competence, efficacy, relatedness, external motivation or internal motivation	Expressions reflecting assistance from the discussed element
GG: VARK	V	sense of efficacy	*'It helped me to understand. . It's clearer that way.'*
	A	sense of efficacy	*'It helped me to concentrate.'*
	A	sense of relatedness	*'Yes, that helped, it always helps.'*
	R	sense of efficacy	*'It helped me and didn't interfere.'*
	K	sense of efficacy	*'It helped to revise the subject matter. . Without the work in the exercise book I think that the subject matter wouldn't have been understood.'*

GG (VARK)

Consideration of V, A, R and K indicates a sense of efficacy.

Consideration of a: shows a sense of relatedness.

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting a sense of belonging, autonomy, competence, efficacy, relatedness, external motivation or internal motivation	Expressions reflecting assistance from the discussed element
GI: VARK	V	sense of efficacy	*'It's easy to learn when there are pictures, they didn't hinder me, it helped.'*
	A	sense of efficacy	*'It helped me to concentrate.'*
	a	sense of relatedness	*'It helped, explaining in words that we understand, giving examples.'*
	R		*'It helped me to understand'.*
	K	sense of efficacy external motivation	*'Yes it helps, it helps to remember and to focus, this way I can check* *If I have really understood, it only helps to remember and to prepare for the examination.'*

GI (VARK)

Consideration of V, A and K indicates sense of efficacy.

Consideration of a indicates the need for teacher relatedness.

There are expressions testifying to external motivation: *'it only helps to remember and to prepare for the examination.'*

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting a sense of belonging, autonomy, competence, efficacy, relatedness, external motivation or internal motivation	Expressions reflecting assistance from the discussed element
GF: VARK	V	sense of efficacy	*'They didn't hinder me, it always helps to understand and remember the subject material.'*
	A		
	a	sense of efficacy	*'I absorbed the subject material better.'*
	R	sense of efficacy	*'It didn't hinder me, it helped me to understand, it didn't hinder me.'*
	K		

GF (VARK)

GF shows a very weak sense of efficacy, marginal, but since she says that the V and R elements helped her r, a sense of efficacy can be seen.

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting a sense of belonging, autonomy, competence, efficacy, relatedness, external motivation or internal motivation	Expressions reflecting assistance from the discussed element
FA: VARK	V	sense of efficacy	*'The animations actually helped, I am focussed and remember. The pictures really jump out at me in front of my eyes and they are really absorbed well in my brain, I remember what we have learned well, my eyes were attracted to the screen, it explained what was important to me.'*
	A		
	a	sense of efficacy sense of relatedness	*'It always helps; she explains with a method that we know.'*
	R	sense of efficacy	*'I focus better on the subject matter, they captured my attention and I remember what is written, it doesn't hinder me at all.'*
	K	sense of relatedness	*'It's important to solve the exercises in the book; you can know the subject matter well and succeed in the exam.* *It helps us to remember and to check whether we have mastered the subject matter.'*

<u>FA (VARK)</u>

A sense of efficacy is evident: since the lesson helped him to understand and build his understanding and also assisted memorisation – this contributed to a sense of efficacy.

Consideration of K – use of *'we'* also relates to others, sees himself as one of a group, indicates sense of relatedness (Peer relatedness).

Consideration of a: expressions indicate need for relationship with the teacher (teacher relatedness).

Name of Pupil: Learning Style	Element used in lesson and examined in the interview	Expressions reflecting a sense of belonging, autonomy, competence, efficacy, relatedness, external motivation or internal motivation	Expressions reflecting assistance from the discussed element
FE: A	V	sense of autonomy	*'It was easy to understand.'*
	A		
	a	sense of efficacy	*'They helped me.'*
	R		*'Sometimes yes.'*
	K	external motivation	*'You need to exercise it in the exercise book.'*

FE (A)

Consideration of A testifies to a sense of efficacy: *'the lessons helped me'*.

Appendix 5.6: Analysis of the Interviews at Stage H

Pupils with R Learning Style										
Pupil's name	Sense of efficacy		Sense of autonomy		Sense of relatedness		Internal motivation		External motivation	
HM	V	a	V	A		a		A		
	K	R	K	R		R	K			
PA	V	A					V			
		R								
HL	V									
	K	R								

Summary for Pupils with R Learning Style

Despite a reservation regarding the small size of this group it can be seen from the above Table that the Visual and Reading/writing parts of the lesson contributed mainly to a sense of self efficacy regarding learning for the pupils with R learning style.

Pupils with K Learning Style										
Pupil's name	Sense of efficacy		Sense of autonomy		Sense of relatedness		Internal motivation		External motivation	
FD	V	Aa,	V			a				
	K	R				K				
EX	V	Aa,					V			a
	K	R								

Summary for Pupils with K Learning Style

Despite a reservation regarding the small size of this group, observation of the above table shows that the different elements of the experimental lesson contributed mainly to a sense of self-efficacy for the pupils with learning style K with regard to their learning. In this group it should be noticed that in addition to the contribution of the Auditory part of the presentation, the teacher's oral explanations were also important for this group

Pupils with A Learning Style										
Pupil's name	Sense of efficacy		Sense of autonomy		Sense of relatedness		Internal motivation		External motivation	
FE		a	V							
									K	
JP	V	aA					V			
	K	R								

Summary for Pupils with A Learning Style

Despite a reservation concerning the small size of this group, observation of the table above shows that the 'a' part of the lesson (teacher's explanation' mainly influenced the sense of self-efficacy for learning for members of the A group. It should be noticed that pupils in this group testified that they were not assisted by all the many elements in the lesson, and felt a sense of efficacy mainly as a result of the teacher's oral explanations.

Pupils with VK, VAK or VAR Learning Style										
Pupil's name& Style	Sense of efficacy		Sense of autonomy		Sense of relatedness		Internal motivation		External motivation	
GH(VK)	V		V				V			
		R			K					
HN(VAR)		a					V			
	K	R								
HK(VAK)	V	A, a,		A				A		
	K	R								

Summary for Pupils with VK, VAK and VAR Learning Style

Despite a reservation concerning the small size of the group the following insights can be drawn from the table above: the learning style of all three pupils includes the Visual element and they did indeed feel that the Visual element contributed to their sense of efficacy regarding their learning, but especially the Reading/writing element enhanced their sense of efficacy for learning. Two pupils who had the A element in their learning style did indeed feel that this element (A) helped them and especially the teacher's oral explanations which enhanced their sense of efficacy for learning, a conclusion which also applied to the group diagnosed with an A learning style.

APPENDIX 6.1: ANALYSIS OF DATA FROM THE OBSERVATIONS IN THE LESSON WITH THE PRESENTATIONS

Analysis of Observation Data - Class E1

Date:22/10/04 ***class: E1***
Presentation:1

Presentation 1 included:

Number of Visual events – 16
Number of Auditory events – 14
Number of Reading\Writing events – 12

These data are presented in the pie chart Graph 6.2 below

Graph 6.2 Events occurring in lesson with Presentation 1, Class E1 (%)

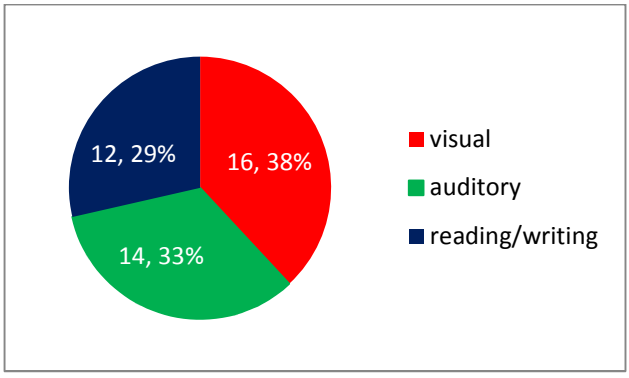


Table 6.7 Lesson Events Record for Class E122.10.2004 (Presentation 1)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
		BH VARK 3	All the pupils 4			All the pupils 1	All the pupils 7	BJ VARK 18							
		EW VARK 5	BF VARK 12			All the pupils 2		BI R 19							
		CL VARK 8				All the pupils 6									
		CN VA 9				All the pupils 7									
		CK RK 10				All the pupils 17									
		AE VRK 11													
		AD R 13													
		DQ VARK 14													
		CM VARK 15													
		EU VARK 16													

Conclusions from Observation in Lesson using Presentation in Class E1on 22.10.2004

Table 6.7 above shows that during this lesson all the pupils watched and participated in the lesson, they also answered the questions that the teacher asked from the presentation. Two pupils, BJ (VARK) and BI (R) were observed not interested in what was happening in the class, they did not watch the presentation while the presentation was being screened.

Most of the pupils' answers to the questions were correct apart from the answer of BF (VARK) and on one occasion all the pupils failed to answer the question, since this question related to subject matter that they had learnt in a previous lesson and when there was a repetition of this previous knowledge, all the pupils were observed not remembering the subject material and answering incorrectly.

Date: 29.10.04 ***Class: E1*** ***Presentation: 2***

Presentation 2 included:

Number of Visual events – 22
Number of Auditory events – 18
Number of Reading\Writing events – 10

These data are presented in the pie chart Graph 6.3 below

Graph 6.3 Events occurring in lesson with Presentation2 Class E1 (%)

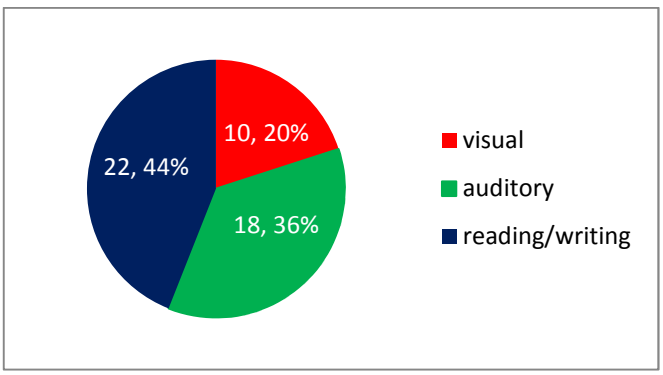


Table 6.8 Lesson Events Record for Class E1 29.10.2004 (Presentation 2)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils 12	BJ VARK 13	DS K 5				All the pupils 3		BJ VARK 4			All the pupils2				
All the pupils 14	BJ VARK 15	DR R 7				All the pupils 6					BJ VAR K.				
All the pupils 25	BI R 16	EW VARK 8				All the pupils 10									
	BJ VARK 25	DP VAK 9				All the pupils 11									
		AA K 18				All the pupils 17									
		BG R 20				All the pupils 19									
		BJ VARK 21				All the pupils 24									
		AB ARK 22													
		DQ VARK 23													

Conclusions from Observation in Lesson using Presentation 2 in Class E1on 29.10.2004

In this lesson, as is clearly seen from Table 6.8 above, there was attentive participation by all the pupils in the class, except for BJ (VARK) who did not cooperate, except for the occasion when she was asked, when despite her lack of cooperation she understood the subject material and answered correctly. At the beginning of the lesson when the teacher explained the subject matter orally, then BJ was attentive.

Date: 5.11.04 ***Class: E1*** ***Presentation: 3***

Presentation 3 included:

Number of Visual events – 27
Number of Auditory events – 15
Number of Reading\Writing events – 15

These data are presented in the pie chart Graph 6.4 below

Graph 6.4 Events occurring in lesson with Presentation 3, Class E1 (%)

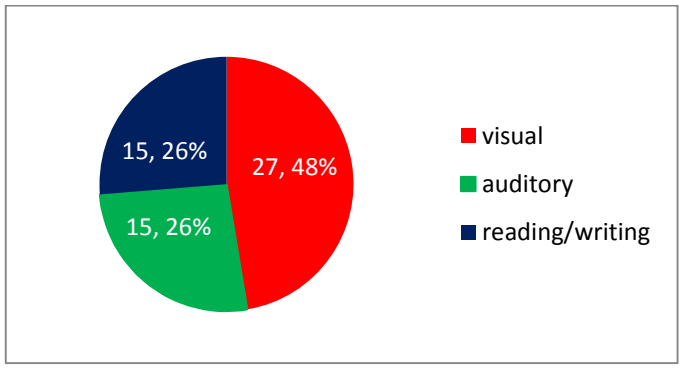


Table 6.9 Lesson Events Record for Class E1 5.11.2004 (Presentation 3)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Eleme nt A	Eleme nt V	Eleme nt A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils 2		DT VAK 1				All the pupils 4					DQ VARK 7	CM VARK 6			
All the pupils 4		BJ VARK 3				All the pupils 5					BJ VARK 7				

Conclusions from Observation in Lesson using Presentation 3 in Class E1 on 5.11.2004

In this lesson a test took place and so there were not many events observed. During the observation it was seen that when the presentation was active the pupils watched (V elements) and listened (A elements) and read and wrote (R elements). They also answered the teacher's questions. While the teacher explained the subject matter they were busy with other matters.

Date: 12/11/04 Class: E1 Presentation: 3

Presentation 3 included:

Number of Visual events – 27
Number of Auditory events – 15
Number of Reading\Writing events – 15

These data are presented in the pie chart Graph 6.5 below

Graph 6.5 Events occurring in lesson with Presentation 3, Class E1 (%)

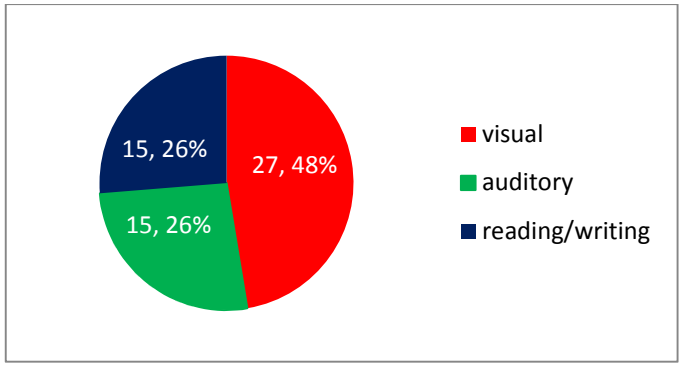


Table 6.10 Lesson Events Record for Class E1 12.11.2004 (Presentation3)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
CM VARK 2	BJ VARK 7	AA K 3	BF VARK			All the pupils 1					BI R 24				
DT VAK 8	BI R 18	AB ARK 6				All the pupils 2					CK RK 25				
CO VARK 14	BJ VARK 18	DR R 9				All the pupils 4									
All the pupils 14	CK RK 18	BG R 12				All the pupils 11									
All the pupils 18	DP VAK 22	AE VRK 15				All the pupils 13									
All the pupils 21		AD R 6				All the pupils 17									
		All the pupils 19				All the pupils 20									

Conclusions from Observation in Lesson using Presentation3 in Class E1on12.11.2004

The researcher again saw the same phenomenon, everyone was attentive and participated; they wrote down rules from the presentation, read out loud and answered questions correctly. There were only a few pupils who did not connect with the lesson: BI(R); BJ (VARK); CK (RK) and BF (VAR) and they were observed again and again occupied with other matters,

Date: 19/11/04 ***Class: E1*** ***Presentation: 4***

Presentation 4 included:

Number of Visual events – 43
Number of Auditory events – 32
Number of Reading\Writing events – 9

These data are presented in the pie chart Graph 6.6 below

Graph 6.6 Events occurring in lesson with Presentation 4, Class E1 (%)

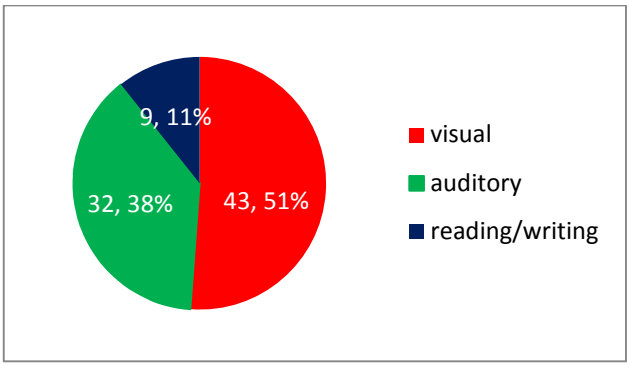


Table 6.11 Lesson Events Record for Class E1 19.11.2004 (Presentation 4)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils 1	BJ VARK 9	AB ARK 4	CN VA 6			All the pupils 1		BJ VARK 2							
		CL VARK 5				All the pupils 3									
		CK RK 7				All the pupils 8									
		BJ VARK 10													

Conclusions from Observation in Lesson using Presentation 4 in Class E1 on 19.11.2004

In this lesson too it was seen that the pupils watched the presentation avidly, performing all the tasks apart from BJ (VARK) who was seen not writing, but when she was asked a question she knew how to answer it correctly (Event 10).

Date:26.11.04 ***Class: E1*** ***Presentation: 5***

Presentation 5 included these events:

Number of Visual events – 81
Number of Auditory events – 33
Number of Reading\Writing events – 14

These data are presented in the pie chart Graph 6.7 below

Graph 6.7 Events occurring in lesson with Presentation 5, Class E1 (%)

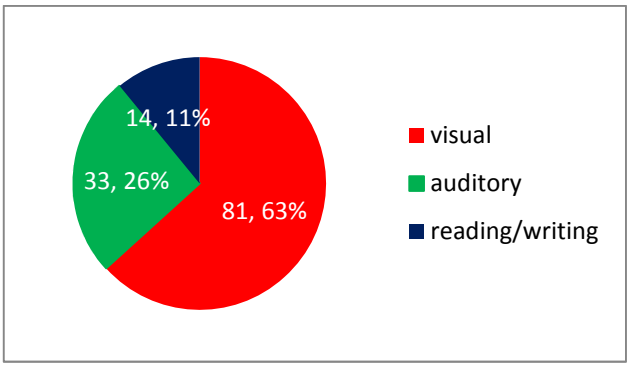


Table 6.12 Lesson Events Record for Class E1 26.11.2004 (Presentation 5)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils 6	BJ VARK 6	BG R 3	DQ VARK 4			All the pupils 2	All the pupils 11	All the pupils 9				CO VARK 1	All of the pupils 5		
All the Pupils/2 10	BJ VARK 7	DT VAK 13				All the pupils 8		BJ VARK 20				BG R 23			
BJ VARK 17 reading						All the pupils 12						AD R 23			
AD R 19						Al f the pupils 14									
BG R 19						All the pupils 21									
						All the pupils 22									

Conclusions from Observation in Lesson using Presentation 5 in Class E1 on 26.11.2004

The lesson took place after the sports lesson, the pupils were tired and sweating, despite the commotion at the beginning of the lesson it was seen that the pupils slowly entered into the lesson and began to enjoy it. Even the pupil BJ (VARK) was observed actively participating in the lesson.

Questions that the pupils were unable to answer correctly were asked by the teacher, but they were not connected to the presentation. It was also seen that two girls with a K learning style BG and AD R felt that they needed to write the sentences in their notebooks to remember them.

Date: 3/12/04 Class: E1 Presentation: 6

Presentation 6 included these events:

Number of Visual events – 93

Number of Auditory events – 57

Number of Reading\Writing events – 8

These data are presented in the pie chart Graph 6.8 below

6.8 Events occurring in lesson with Presentation 6, ClassE1 (%)

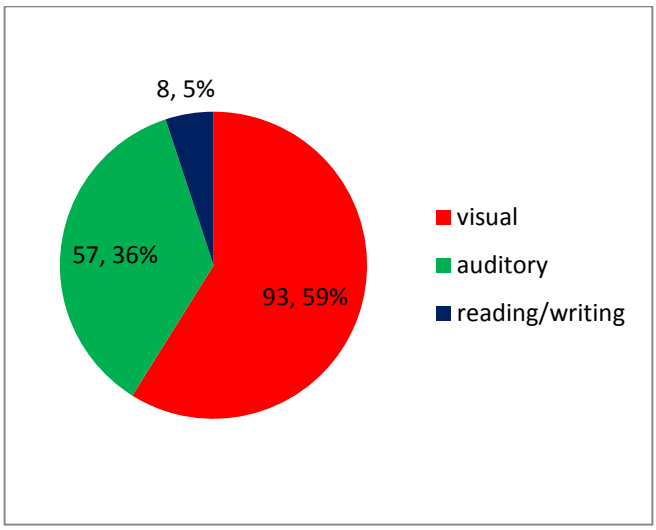


Table 6.13 Lesson Events Record for Class E 1 3.12.2004 (Presentation 6)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked			The other pupils
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils 13	All the pupils 13	BI R 4			EU VARK 14	All the pupils 2	All the pupils 3	EU VARK 2			EU VARK 1				DQ VARK 10
All the pupils 16	BJ VARK 16	CM VARK 6			CK RK 14	All the pupils 5		CK RK 2			CK RK 1				DR R 10
All the pupils 17	BJ VARK 17	BG R 8			DT VAK 14	All the pupils 7		DT VAK 2			DT VAK 1				BJ VARK 11
	AD R 17				AD R 15	All the pupils 9									DR R 11
															DQ VARK 12
															BJ VARK 12
															CN VA 12
															CO VARK 12

Conclusions from Observation in Lesson using Presentation 6 in Class E1 on 3.12.2004

In this lesson a difficulty in the Reading/writing element was observed. Not all the pupils managed to copy the rules. The teacher asked questions that were not connected to the presentation, some of the pupils were occupied with other matters.

In this lesson there was a mixed trend of participation and non-participation. The boys' group that created the commotion in the class, had the K element in their learning style, BJ is a girl with special needs who did not write anything in any of the lessons (see Appendix 8.1: Protocols of Observations).

Date: 24.12.04 Class: E1 Presentation:7

Presentation 7 included these events:
Number of Visual events – 103
Number of Auditory events – 57
Number of Reading\Writing events – 21

These data are presented in the pie chart 6.9 below

Graph 6.9 Events occurring in lesson with Presentation 7, Class E1 (%)

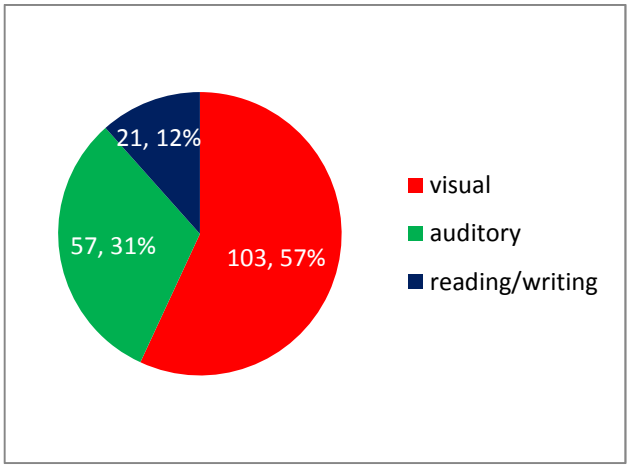


Table 6.14 Lesson Events Record for Class E1 24.12.2004 (Presentation 7)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils 10		CN VA 3	CO VARK 5			All the pupils 2	All the pupils 9								All the pupils 1
BJ VARK 11		BF VARK 6				All the pupils 4	All the pupils 16								
All the pupils 16		BG R 14				All the pupils 7									
All the pupils 18		AE VRK 15				BH VARK 8									
						All the pupils 13									
						All the pupils 16									

***Conclusions from Observation in Lesson using Presentation 7 in Class E1 on* 24.12.2004**

The lesson went well, it was seen that most of the time the pupils watched the presentation and cooperated. The pupils expressed their pleasure regarding the lesson that they watched and listened to and performed the writing tasks.

Apart from the beginning of the lesson when the teacher explained something (Event 1) BJ (VARK) participated and answered questions.

Date: 07.01.05 Class: E1 Presentation: 81

Presentation 81 included:

Number of Visual events – 63
Number of Auditory events – 30
Number of Reading\Writing events – 12

These data are presented in the pie chart Graph 6.10 below

Graph 6.10 Events occurring in lesson with Presentation 81, Class E1 (%)

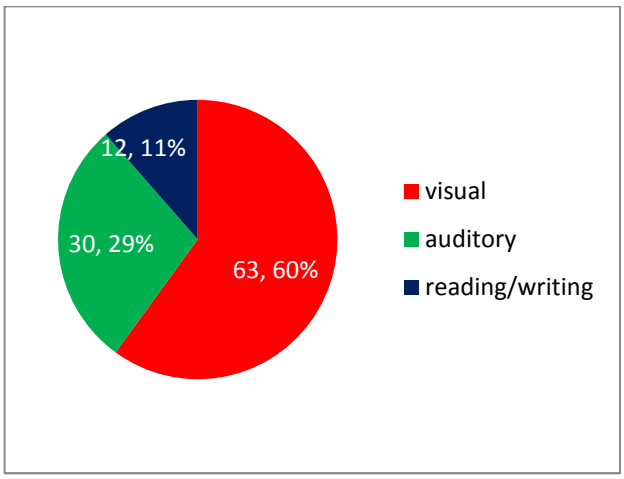


Table 6.15 Lesson Events Record for Class E1 7.1.2005 (Presentation 81)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils 6		AB ARK 3				All the pupils 2	All the pupils 7	CK RK 1							
All the pupils 7		CN VA 3				All the pupils 4		DT VAK 1							
All the pupils 9		EW VARK 8				All the pupils 7									

Conclusions from Observation in Lesson using Presentation 81 in Class E1 on 7.1.2005

In this lesson the pupils were observed as they worked well, watching the presentation, writing and performing the required activities except for two pupils: CK (RK) (event 1) and DT (VAK) (event 1) who spoke about the silhouettes in the presentation and did not look at the presentation while it was active.

Date:25.02.05 Class: E2 Presentation: b

Presentation b included:

Number of Visual events – 64
Number of Auditory events – 24
Number of Reading\Writing events – 20

These data are presented in the pie chart Graph 6.11 below

Graph 6.11 Events occurring in lesson with Presentation b, Class E1 (%)

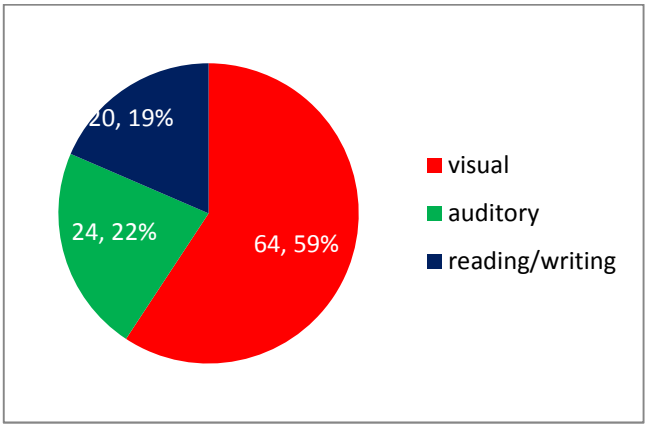


Table 6.16 Lesson Events Record for Class E1 25.2.2005 (Presentation b)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils 3	BJ VARK 4	EV VRK 6	EV VRK 12			All the pupils 2		DQ VARK 6	DQ VARK 5	All the pupils 1	AA K 1				
All the pupils 7	BJ VARK 10	ACVARK 9				All the pupils 8			EW VARK 11		AD R 1				
All the pupils 10	DQ VARK 14	AE VRK 13				All the pupils 20					DQ VARK 1				
All the pupils 14		CN VA 18													
EV VRK 16		CL VARK 19													
CM VARK 17															
All the pupils 21															

Conclusions from Observation in Lesson using Presentation b in Class E1 on 25.2.2005

In this lesson no major problems were observed, the pupils participated and read and wrote, the researcher noticed one problem when the pupils needed to perform the writing activity and immediately or during the writing they were also asked to look at the presentation. This situation created much frustration for them.

Date: 11 03 05. Class: E1 Presentation: b

Presentation b included:
Number of Visual events – 64
Number of Auditory events – 24
Number of Reading\Writing events – 20

These data are presented in the pie chart Graph 6.12 below

Graph 6.12 Events occurring in lesson with Presentation b, Class E1 (%)

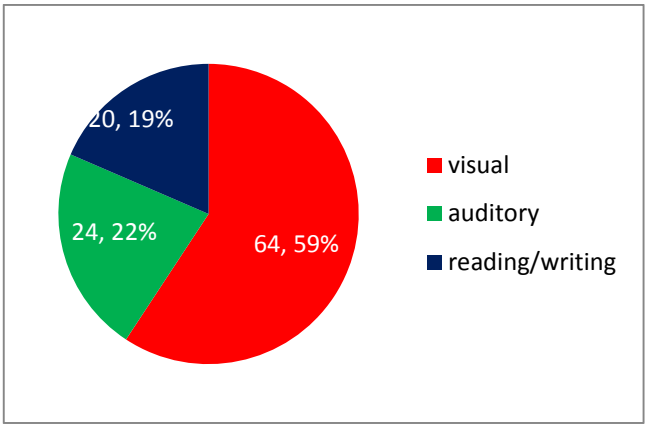


Table 6.17 Lesson Events Record for Class E1 11.3.2005 (Presentation b)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
CK RK 3	BJ VARK 12	DQ VARK 1	All the pupils 4		AB ARK 7	All the pupils 2			All the pupils 9						
All the pupils 12	BJ VARK 13	EV VRK 6	AD R 8		AD R 10	All the pupils 5									
All the pupils 13			All the pupils 11												

Conclusions from Observation in Lesson using Presentation b in Class E1 on 11.3.2005

This lesson was short because the photographer came in to the class to photograph the pupils for a special event. The lesson did not flow properly, pupils did not listen, they did not answer correctly perhaps they had not met in this class for two weeks.

Date: 18.03.05 ***Class:E1 Presentation: q***

Presentation q included:

Number of Visual events – 74
Number of Auditory events – 49
Number of Reading\Writing events – 19

These data are presented in the pie chart Graph 6.13 below

Graph 6.13 Events occurring in lesson with Presentation q, Class E1 (%)

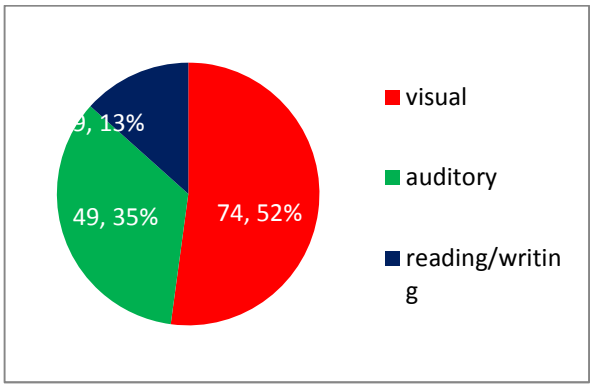


Table 6.18 Lesson Events Record for Class E1 18.3.2005 (Presentation q)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils 5	BJ VARK 5	AA K 2	DP VAK 13		DR R 3	All the pupils 1		CN VA 1							
All the pupils 8	AB ARK 33	DT VAK 4	BG R 14		CO VARK 6	All the pupils 9		CO VARK 1							
BI R 21	All the pupils 37	CN VA 6	BG R 20		DP VAK 6	DQ VARK 24		DP VAK 1							
		CN VA 10	BH VARK 26		All the pupils 30	All the pupils 36									
		BG R 7	AA K 28			EW VARK 35									
		BG R 11	CN VA 29												
		EV VRK 12													
		BJ VARK 15													
		EU VARK 16													
		DQ VARK 17													
		ACVARK 19													
		CN VA 22													
		EW VARK 23													
		ACVARK 25													
		EW VARK 27													
		EW VARK 31													
		EU VARK 32													
		EV VRK 32													
		CL VARK 34													

Conclusions from Observation in Lesson using Presentation q in Class E1 on 18.3.2005

Study of Table 6.18 above shows that the pupils were attentive and participated in the lesson, both by writing and also by answering the questions, although some of the pupils did not listen to their peers' words. The pupils' participation was attentive.

Analysis of Observation Data - Class E2

Date: ***22.10.04*** ***Class:*** ***E2*** ***Presentation: 1***

Presentation 1 included:

Number of Visual events – 16
Number of Auditory events – 14
Number of Reading\Writing events – 12

These data are presented in the pie chart Graph 6.14 below

Graph 6.14 Events occurring in lesson with Presentation1, Class E2 (%)

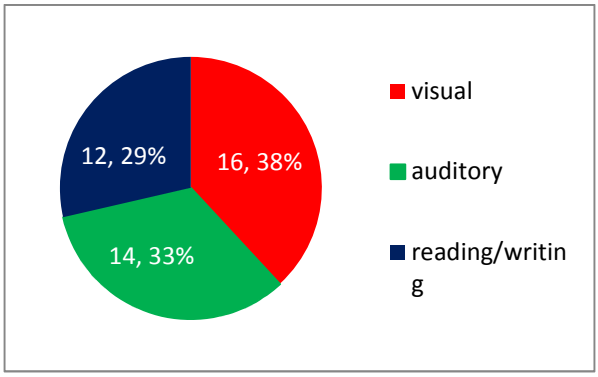


Table 6.19 Lesson Events Record for Class E2 on 22.10.2004 (Presentation 1)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
		EX K 3	FD K 4			All the pupils 1	All the pupils 2								
		HM R 5	FC VARK 4			All of the pupil 8	All of the pupil 6								
		EX K 7	GI VARK 4			All of the pupil 9									
		FZ VARK 10				All of the pupil 12									
		HN VAR 11													

Conclusions from Observation in Lesson using Presentation 1 in Class E2 on22.10.2004

In this lesson the researcher noticed that when the presentation was active the whole class listened, watched and participated. The teacher turned to the pupils and mostly they answered correctly apart from 3 pupils: GI (VARK), FC (VARK) and FD (K).

Date: 29.10.04 ***Class:*** ***Presentation:2***

Presentation 2 included:
Number of Visual events – 22
Number of Auditory events – 18
Number of Reading\Writing events – 10

These data are presented in the pie chart Graph 6.15 below

Graph 6.15 Events occurring in lesson with Presentation2, Class E2 (%)

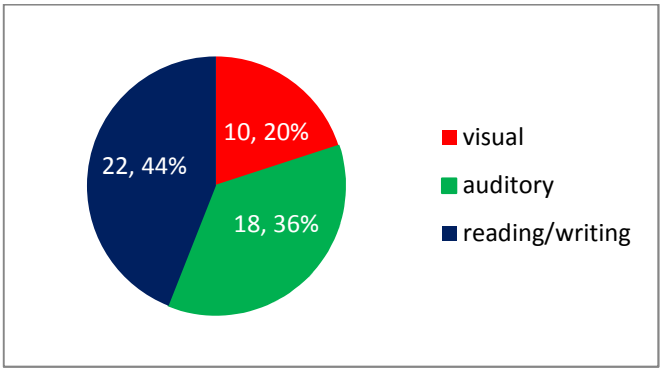


Table 6.20 Lesson Events Record for Class E2 29.10.2004 (Presentation 2)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
FE A 6	GF VARK 5	EX K 2	All the pupils 12			All the pupils 1	All the pupils 4				FD K 16				
All the pupils 7	FC VARK 12		All the pupils 19 לא מבינים			All the pupils 3	All the pupils 9				FC VARK 17				
All the pupils 11						All the pupils 8					HM R 18				
All the pupils 13						All the pupils 9									
						All the pupils 10									
						All the pupils 11									
						All the pupils 14									
						All the pupils 15									

Conclusions from Observation in Lesson using Presentation 2in Class E2 on 29.10.2004

When the presentation was active the class watched and listened and when the element of Writing was employed, all the pupils were busy with this task, apart from GF (VARK) and FC (VARK) who did not cooperate.

When the presentation was inactive and the teacher explained the subject matter, most of the pupils participated apart from three pupils: FC (VARK), FD (K) and HM (R)

Date: 05.11.04 Class: E2 Presentation:3

Presentation 3 included:
Number of Visual events – 27
Number of Auditory events – 15
Number of Reading\Writing events – 15

These data are presented in the pie chart Graph 6.16 below

Graph 6.16 Events occurring in lesson with Presentation3, Class E2 (%)

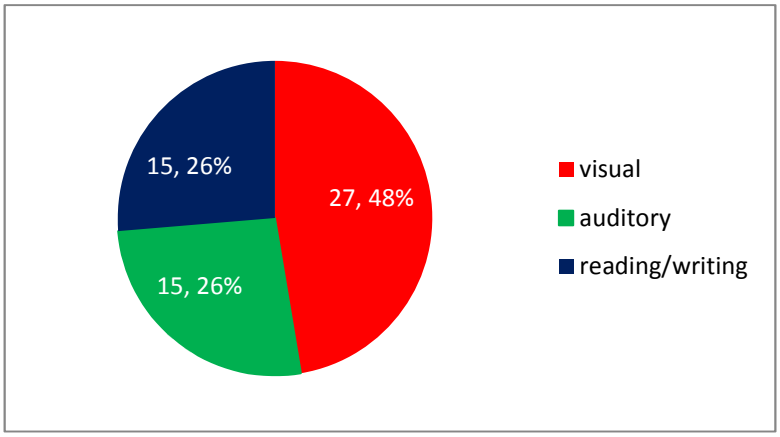


Table 6.21 Lesson Events Record for Class E2 5.11.2004 (Presentation 3)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
HM R 14		FB VARK 3	EX K 7			All the pupils 1									
		HL R 5	GF VARK 15			All the pupils 2									
		GJ VARK 6	GJ VARK 15			All the pupils 4									
		FA VARK 8	HN VAR 15			All the pupils 9									
		FC VARK 11				All the pupils 10									
		EY VARK 12				All the pupils 13									

Conclusions from Observation in Lesson using Presentation 3 in Class E2 on 5.11.2004

It was clearly obvious that the pupils very much enjoyed the lesson and they were very focussed and participated fully. The lesson was dynamic – apart from 4 pupils who failed to answer questions correctly: GI (VARK), GF (VARK), EX (K) and HN (VAR). All the others answered correctly including the pupil FC (VARK) whose success in the task pleased everyone including the teacher.

Date: 12.11.04 Class: E2 Presentation:4

Presentation 4 included:
Number of Visual events – 43
Number of Auditory events – 32
Number of Reading\Writing events – 9

These data are presented in the pie chart Graph 6.17 below

Graph 6.17 Events occurring in lesson with Presentation 4, Class E2 (%)

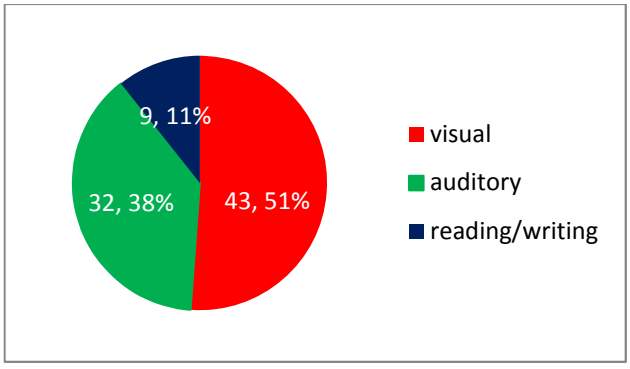


Table 6.22 Lesson Events Record for Class E2 12.11.2004 (Presentation 4)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils 1	FC VARK 1	HN VAR 4				All the pupils 5		* All the pupils 2							
All the pupils 3	FD K 1	HM R 4				All the pupils 6									
All the pupils 6	JP A 1	EY VARK 4													

Conclusions from Observation in Lesson using Presentation 4 in Class E2 on 12.11.2004

The pupils did not complete their drawing of the table in their note books. This lesson was a lesson that combined Writing and observation of the presentation. It seemed that all the pupils were very active, enjoying the lesson, watching the presentation. They answered the questions and wrote things down in the table apart from EY (VARK), HM (R) and HN (VAR) who did not answer correctly. During Event 2 the pupils did not manage to perform the task of drawing the table in their notebooks, so that they watched the presentation, but it seemed as if the presentation interested them very much and they cooperated.

Date:26/11/04 Class: E2 Presentation:5

Presentation 5 included:
Number of Visual events – 81
Number of Auditory events – 33
Number of Reading\Writing events – 14

These data are presented in the pie chart Graph 6.18 below

Graph 6.18 Events occurring in lesson with Presentation 5, Class E2 (%)

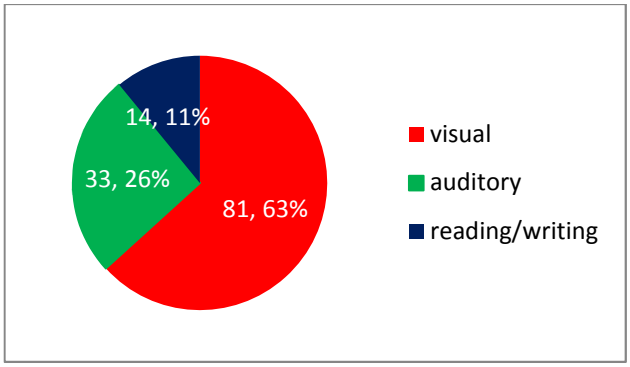


Table 6.23 Lesson Events Record for Class E2 26.11.2004 (Presentation 5)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn'trespond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils 3		FC VARK 4	EX K 21		FA VARK 13	All the pupils 2	All the pupils 6								FA VARK 1
GG VARK 12		HN VAR 5	FC VARK 21			All the pupils 7									
		JP A	GI VARK 21			FA VARK 9									
		FC VARK 10				FC VARK 14									
		GG VARK 16				All the pupils 15									
		JP A 19				JP A 18									
						All the pupils 20									

Conclusions from Observation in Lesson using Presentation 5 in Class E2 on 26.11.2004

The lesson was very dynamic, the pupils cooperated, smiled and were excited and they read and wrote happily. What was especially outstanding was that the academically weaker pupils, FC (VARK) and GG (VARK) despite their difficulties absorbed the subject matter and enjoyed the lesson. FC (VARK) answered correctly which surprised the teacher and the other pupils, and it was obvious from their faces that they were happy about this.

When the subject matter became more complicated and difficult (more than one verb in a sentence) it was difficult for the weaker pupils (Haramati, 2002)

Date:3/12/04 Class: E2 Presentation:6

Presentation 6 included:
Number of Visual events – 93
Number of Auditory events – 57
Number of Reading\Writing events – 8

These data are presented in the pie chart Graph 6.19 below

Graph 6.19 Events occurring in lesson with Presentation 6, Class E2 (%)

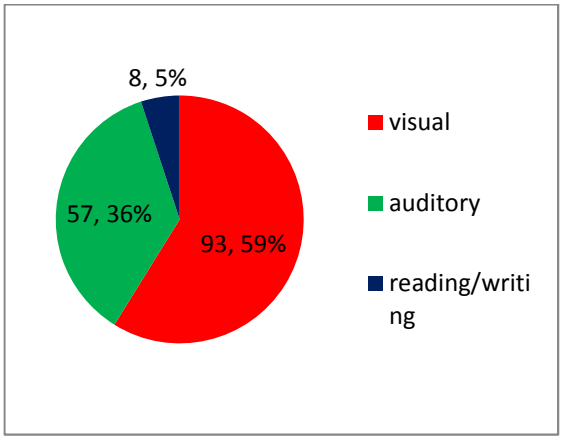


Table 6.24 Lesson Events Record for Class E2 3.12.2004 (Presentation 6)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
FZ VARK 2	HK VAK 9	FE A 3	HK VAK 6			All the pupils 1	All the pupils 4				FD K 15				
HM R 8	FD K 9	GI VARK 7				All the pupils 5					EX K15				
All the pupils 9	EX K 9					All the pupils 10					All the pupils 16				
All the pupils 11						All the pupils 12									
All the pupils 14						All the pupils 19									
All the pupils 17															
All the pupils 18															
All the pupils 19															

Conclusions from Observation in Lesson using Presentation 6 in Class E2 on 3.12.2004

In this lesson the researcher saw that the pupils participated and were active, when the teacher explained the subject matter and spoke it was seen that the pupils' attention decreased and some pupils: EX (K) and FD (K) were observed as inattentive.

Date: 24/12/04 ***Class:E2*** ***Presentation:7***

Presentation 7 included:

Number of Visual events – 103
Number of Auditory events – 57
Number of Reading\Writing events – 21

These data are presented in the pie chart Graph 6.20 below

Graph 6.20 Events occurring in lesson with Presentation 7, Class E2 (%)

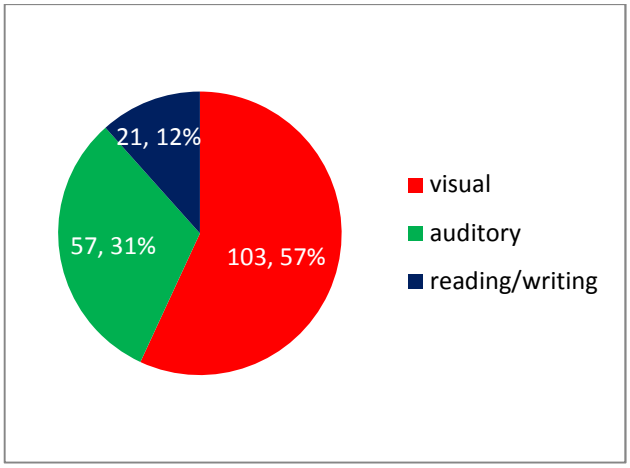


Table 6.25 Lesson Events Record for Class E2 24.12.2004 (Presentation 7)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils 7			HO R 6			All the pupils 3	All the pupils 5				All the pupils 4	All the pupils 1	HN VAR 2		
						HN VAR 3							HN VAR 2		
						GG VARK 3									
						All the pupils 4									
						All the pupils 5									

Conclusions from Observation in Lesson using Presentation 7 in Class E2 on 24.12.2004

In this lesson the researcher saw that when the presentation was active there was full participation by all the pupils in the class both when there were Visual events and during some Auditory events, but when the teacher explained the subject matter the pupils were occupied with other matters.

Date:07.01.05 ***Class: E1*** ***Presentation:81***

Presentation 81 included:
Number of Visual events – 63
Number of Auditory events – 30
Number of Reading\Writing events – 12

These data are presented in the pie chart Graph 6.21 below

Graph 6.21 Events occurring in lesson with Presentation81, Class F (%)

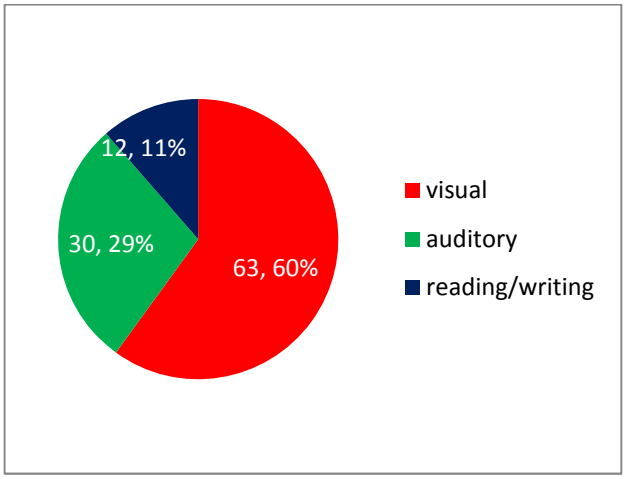


Table 6.26 Lesson Events Record for Class E2 7.1.2005 (Presentation 81)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils 6		EY VARK 2	FZ VARK 3			All the pupils 1					All the pupils 8				
All the pupils 7			JP A 3			GH VK 4									
All the pupils 9						All the pupils 5									

Conclusions from Observation in Lesson using Presentation 81 in Class E2 on 5.11.2004

In this lesson the pupils were observed displaying alertness, they were focussed and cooperated, and wrote. Two pupils gave erroneous answers: JP (A) and FZ (VARK), it was noticed that the teacher did not use the same expressions used in the presentation to explain the subject matter.

Date:25/02/05 Class: E2 Presentation:b

Presentation ***b*** included:
Number of Visual events – 64
Number of Auditory events – 24
Number of Reading\Writing events – 20

These data are presented in the pie chart Graph 6.22 below

Graph 6.22 Events occurring in lesson with Presentation b, Class E2 (%)

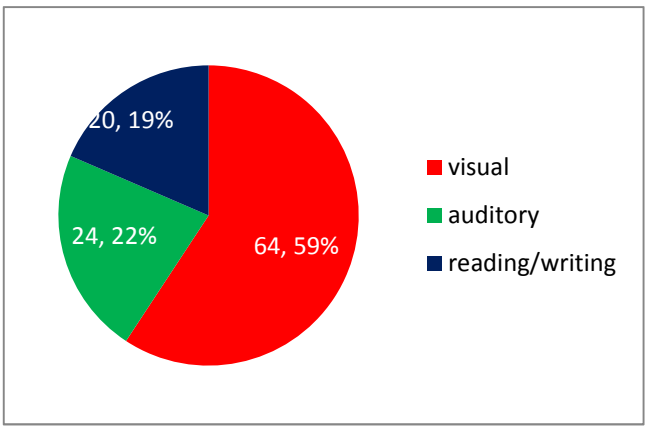


Table 6.27 Lesson Events Record for Class E2 25.2.2005 (Presentation b)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils 4		GF VARK 2				All the pupils 1		HN VAR 1	GI VARK 8			FE A 10			
All the pupils 6		FA VARK 5				GF VARK 3		HN VAR 9				HM R 11			
All the pupils 8								GI VARK 7				FZ VARK 11			
All the pupils 9								FZ VARK 7				GI VARK 11			

Conclusions from Observation in Lesson using Presentation b in Class E2 on 25/02/05

In this lesson it seemed that the pupils, apart from HN (VARK) all participated, listened, understood and worked. It was a dynamic lesson; the pupils also answered correctly and were attentive and concentrated on what was happening in the presentation, apart from HN (VARK) whose attention was distracted.

Date: 11.03.05 Class: E2 Presentation:b (2nd screening)

Presentation b (2nd screening) included these events:

Number of Visual events – 64
Number of Auditory events – 24
Number of Reading\Writing events – 20

These data are presented in the pie chart Graph 6.23 below

Graph 6.23 Events occurring in lesson with Presentation b (2nd screening), Class 6 (%)

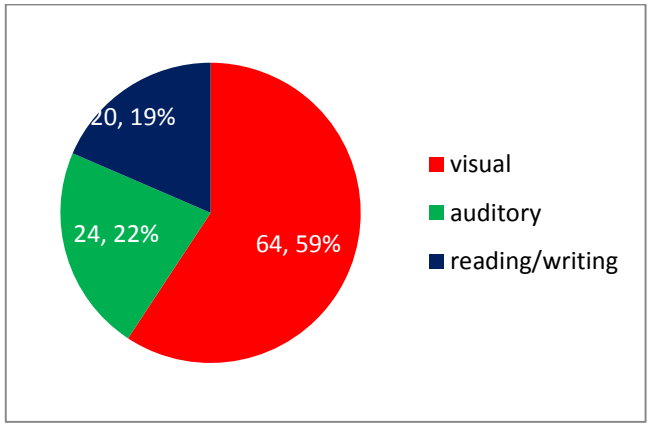


Table 6.28 Lesson Events Record for Class E2 25.2.2005 Presentation b (2nd screening)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils 8	FD k 8	EY VARK 2				All the pupils 1									
	HN VAR 8	GF VARK 4				All the pupils 3									
		HL R 5				All the pupils 6									
		GG VARK 10				All the pupils 7									
		GH VK 11				All the pupils 9									
		FE A 12				All the pupils 13									

Conclusions from Observation in Lesson using Presentation b in Class E2 on5.11.2004

In this lesson too it was clearly seen that all the pupils in the class watched the presentation when it was active, when they had to write the rules or to read them. When the teacher asked questions from the presentation the pupils answered correctly, the exceptions were: FD (K) and HN (VAR) who did not cooperate with the Writing task.

Date:18/03/05 ***Class E2*** ***Presentation: q***

Presentation q included:

Number of Visual events – 74
Number of Auditory events – 49
Number of Reading\Writing events – 19

These data are presented in the pie chart Graph 6.24 below

Graph 6.24 Events occurring in lesson with Presentation q, Class F (%)

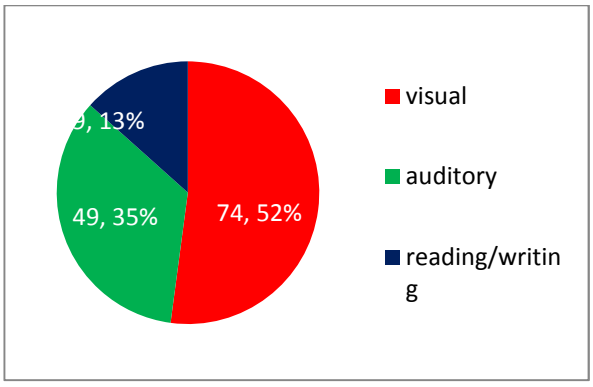


Table 6.29 Lesson Events Record for Class E2 18.3.2005 (Presentation q)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils 4		HO r 2				All the pupils 1	All the pupils 21	HN VAR 15							
All the pupils 8		FZ VARK 6				All the pupils 3									
JP a 12		JP a 7				All the pupils 5									
All the pupils 18		GI VARK 9				All the pupils 13									
All the pupils 22		HN VAR 10				All the pupils 15									
EY VARK 23		HO r 11				All the pupils 17									
		GG VARK 11				All the pupils 21									
		FE A 14				All the pupils 6									
		HM R 16													
		JP A 19													
		HL R 19													
		GH VK 20													

Conclusions from Observation in Lesson using Presentation q in Class E2 on18.3.2005

No exceptional activity was observed during this lesson; all the pupils watched the presentation, during the Visual and Auditory events. All the pupils wrote down the rules and read out loud without exception. The pupils who were asked questions by the teacher, answered correctly.

Analysis of Observation Data - Class F

Data collected from all Class F lessons with the presentation

Date: 22.10.2004 Class: F Presentations:1 and 2

Presentation1 included:

16 Visual events (see Section 3.9.9 for a definition of 'event')

10 Auditory events

12 Reading/writing events

Presentation2 there were:

22 Visual events

18 Auditory events

10 Reading/writing events

These data are represented in the Graph 6.25 below

Graph 6.25 Events occurring in lesson with Presentations*: 1 and 2*, Class F (%)

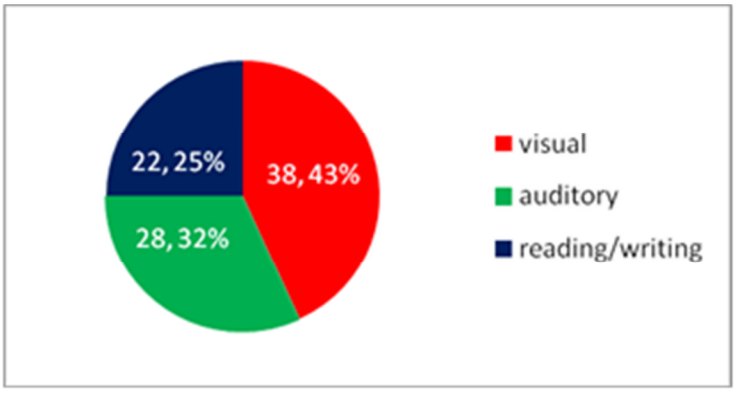


Table 6.30 Lesson Events Record for Class F on 22.10.2004 (Presentations 1 and 2)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question regarding the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils 2						All the pupils 1	All the pupils 1	MF_RK 16		JT_R-11	ME_K 3	NM_VARK 4			MG_K 6
MG_K 14						MG_K 17		ME_K 16		OS_VAR K-11	MF_RK 3	OS_VARK 5			LC_VRK 6
								LD_VR 16		LB_VAR K-11	LD_VR3	LB VARK 7			MI_K 6
								All the pupils18		OV_R-11		MF_RK 8			MG_K 9
										MF_RK-11		OV_R 12			LC_VRK9
												JT_R 12			MI_K 10
												LC_VRK15			LB_VARK 13
												OT_VARK19			LC_VRK13

Conclusions from the Observation during Presentations 1 and 2 in Class F on 22.10.2004

The researcher looked at the Lesson Events Record and summarised her observations by marking number in the appropriate cell, the same number was registered beside the record of the event in the Observation Protocol (see Appendix 8.1). These numbers were marked in the table to enable the researcher to re-read a particular part of the observation protocol that needed clarification. For example when a Visual event appeared in the presentation, the events occurring simultaneously in the class were recorded in the appropriate cells together with the number 18, this enabled the researcher to return to the observations and see what exactly happened in event 18 that occurred in a lesson on 22.10.2004. It transpires that this event occurred at the end of the lesson, when everybody was already tired enabling the researcher to understand what had happened during this event and why (pupils were already heard exiting for the break).

The data shown in the exemplary Lesson Events Record above 6.2 for the part of the lesson which included a combination of teaching styles, indicates that almost no events of pupils not showing interest were observed; when the presentation was showing Visual and Auditory events 'the pupils seemed to enjoy the presentation, they said: *'what fun, how beautiful'* except for three girls, MF(RK), ME(K) and LD(VR) who conversed with each other during the Visual event; it can be seen that all three girls do not have an Auditory element in their learning style and two of them do not have a Visual element. Toward the end of the lesson they are already bored and not listening (item 18) and when the Read/Write part of the lesson took place in which the pupils had to copy the rules to their notebook, *'full participation by all the class'* pupils was observed; *'at this stage all pupils copied the rule from the screen to the notebook*.

In the part of the lesson which included just one teaching style (Auditory style (a), the teacher explains and asks questions), one can see that eight pupils whom the teacher approached with a question, answered correctly while at the same time eight other pupils were busy with other things; there is no particular common characterisation of the learning style of this group; while the teacher

repeatedly explained the learning material, 3 pupils were observed occupied with other things (it interesting that element A is not included in their learning style) and at the same time 5 pupils were observed as participating in the lesson.:

Date: 05.11.2004 Class: F Presentation: 4

Presentation 4 included:
43 Visual events
32 Visual events
9 Reading/writing events

These data are presented in the pie chart Graph 6.26 below

Graph 6.26 Events occurring in lesson with Presentation 4 Class F (%)

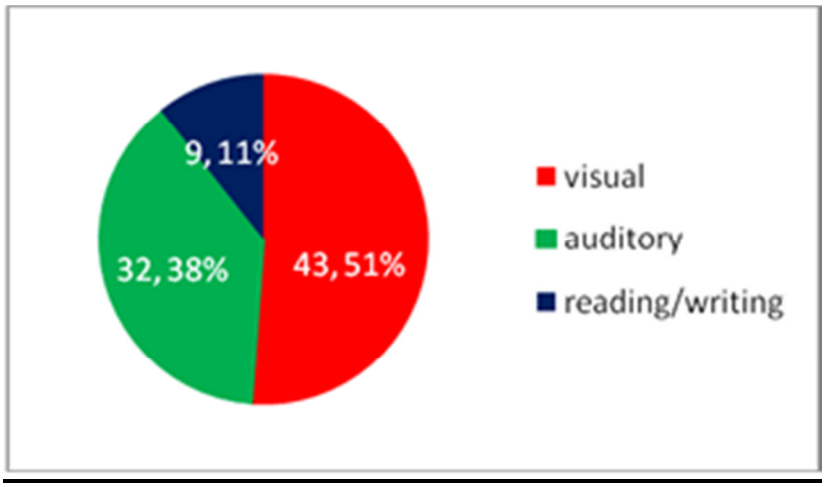


Table 6.31 Lesson Events Record for Class F on 5.11.2004 (Presentation 4)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils-4	NN_K-6-8					All the pupils-4	All the pupils-4				All the pupils-3	LC_vrk-2			KX_VARK-1
All the pupils-3(pupils)-5	MG_K-6-8										OS_VARK-3				MG_K 1
All the pupils-3(pupils)-7	LB_VARK-6-8														

Conclusions from the Observation during Presentation 4, Class F on 5.11.2004

Study of the Lesson Events Record for this lesson, clearly indicates that, during the lesson, while the presentation was projected the entire class listened and worked, they gladly filled in the verbs in the table and later, when the teacher asked them to copy the table to their notebooks, all the pupils were observed working except for three pupils, two with a Kinaesthetic style and one integrated special needs pupil who did not participate in the writing.

During this lesson, the teacher stopped the presentation, emphasising and explaining the subject matter orally to the pupils; in this part of the lesson, all the pupils were busy doing other things except for one pupil who was asked and answered correctly.

Date: 19.11.2004 Class: F Presentation 6

Presentation 6 included:
93 Visual events
57 Auditory events
8 Reading/writing events

These data are presented in the pie chart Graph 6.27 below

Graph 6.27 Events occurring in lesson with Presentation *6,* Class F (%)

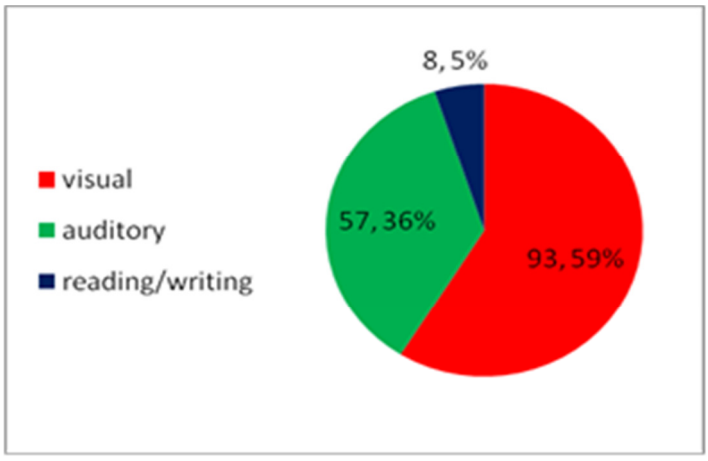


Table 6.32 Lesson Events Record for Class F 19.11.2004 (Presentation 6)

The presentation was in progress										presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or participated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils pupils-5	KV_VARK**-6**					**All the pupils pupils-4**				KU_A**-2**	**All the pupils**	JR_RK**-3**	**All the pupils pupils-1**		
	OS_VARK**-6**									KW_VARK**-2**	JS_R**-10**		MI_K**-8**		
	ME_K**-6**									KY_VARK**-2**	MI_K**-10**				
	KV_VARK**-7**														
	OS_VARK **-7**														
	ME_K**-7**														

Conclusions from the Observation during Presentation 6, Class F on 19.11. 2004

When the teacher is busy providing questions and answers, it can be observed that although the pupil questioned by the teacher relates and answers, the other pupils are busy doing other things (the teacher asked them to perform something but they do not perform this and do not look at her); while the presentation displays an animation(a Visual event), all - (event 4)are interested and when there is a Reading/writing event, they all perform it except for three girls who chat with each other and whose learning style is VARK; Element K appears in the learning style of all these pupils.

Date: 26.11.2004 Class: F Presentation7

Presentation 7 included:
103 Visual events
57 Auditory events
21 Reading/writing events

These data are presented in the pie chart Graph 6.28 below

Graph 6.28 Events occurring in lesson with Presentation 7 Class F (%)

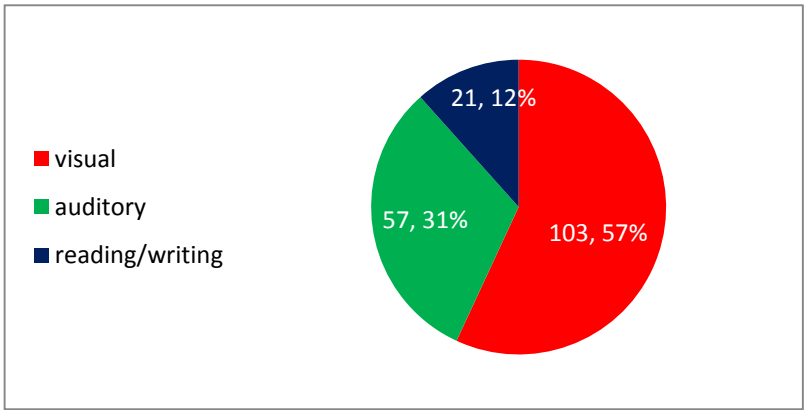


Table 6.33 Lesson Events Record for Class F on 26.11.2004(Presentation 7)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the task R	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils pupils-3		OV_R-4				CL_VARK-1		NN_K-7							
All the pupils pupils-6		JT_R-5				All the pupils pupils-2									

Conclusions from the Observation during Presentation 7 in Class F on 26.11.2004

On this day, the teacher returned exams, which had received high marks to the pupils. The teacher explained the exam, so that, in this lesson, there were few other events. The teacher did not stop the presentation to explain the presentation orally, but worked according to the presentation; during the Reading/writing and Visual events all pupils listened, observed and participated (there was a game in the presentation) and only NN (K) 'does not look at the screen'.

Date: 03.12.2004 Class: F Presentation: 81

Presentation81 included:

103 Visual events
57 Auditory events
21 Reading/writing events

These data are presented in the pie chart Graph 6.29 below

Graph 6.29 Events occurring in lesson with Presentation81 Class F (%)

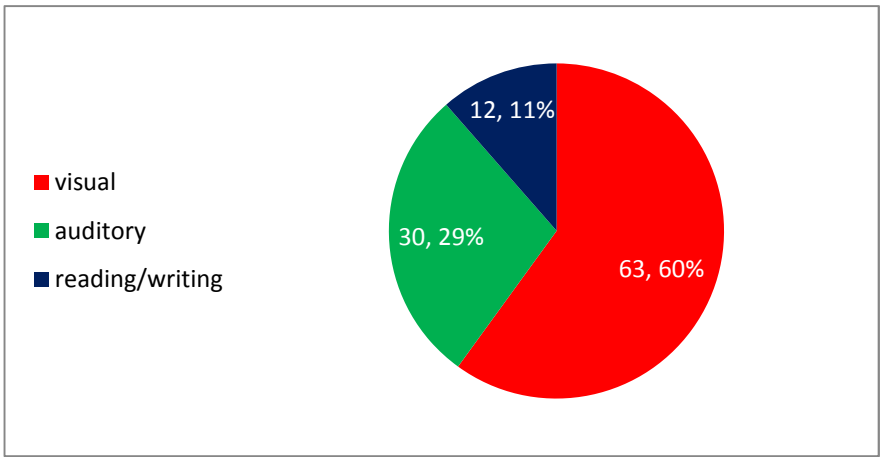


Table 6.34 Lesson Events Record for Class F 3.12.2004(Presentation 81)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
						All the pupils-2		MI_K-5			All the pupils-3				
						All the pupils-4		ME_K-5			MI_K-1				
								LD_VR-6			ME_K-1				
											LD_VR-1				

Conclusions from the Observation during Presentation 81 in Class F on 3.12.2004

On this day, the books were reorganised in the library (this is the room in which the research lesson took place) so that some of the tables were loaded with books and the lesson started late and few events occurred (event 4). While the presentation was working; almost all the pupils gave it their full attention except for three girls whose learning styles were VR; K; and K who *were busy doing other things'.* During the teacher's oral explanation, all the pupils were busy doing other things.

Date: 24.12.2004 Class: F Presentation: 9

Presentation 9, included:
60 Visual events
19 Auditory events
18 Reading/writing events

These data are presented in the pie chart Graph 6.30 below

Graph 6.30 Events occurring in lesson with Presentation 9 Class F (%)

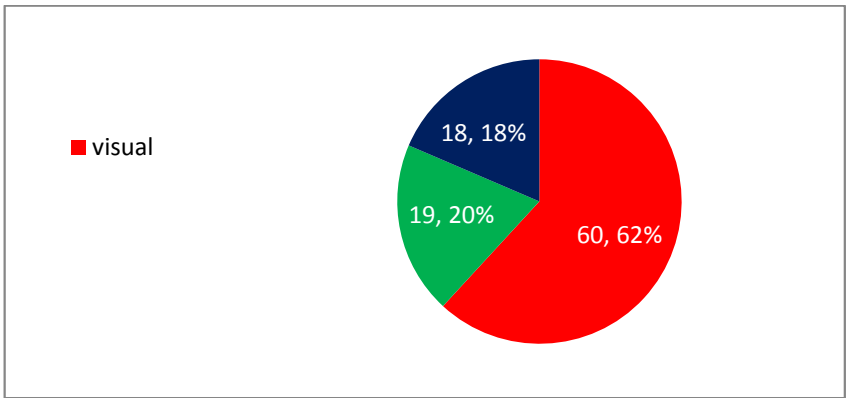


Table 6.35 Lesson Events Record in Class F 24.12.2004 (Presentation 9)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils pupils-2	All the pupils pupils-5					All the pupils pupils-1					All the pupils pupils-6	OV_R-3			
						All the pupils pupils-4						JT_R-3			
						All the pupils pupils-6									

Conclusions from the Observation during Presentation 9 in Class F on 24.12.2004

The presentation was working and all the pupils were listening except for a Reading/writing event during which the pupils chatted with each other (Event 5) and did not read from the screen as they were asked to do.
When the teacher asked the two pupils with style K, they answered correctly (i.e. they seemed to have mastered the learning material) and the rest of the pupils continued to chat (event-6).

Date: 07.01.2005 Class: F Presentation a

Presentation a included:

104 Visual events
81 Auditory events
20 Reading/writing events

These data are presented in the pie chart Graph 6.31 below

Graph 6.31 Events occurring in lesson with Presentation a Class F (%)

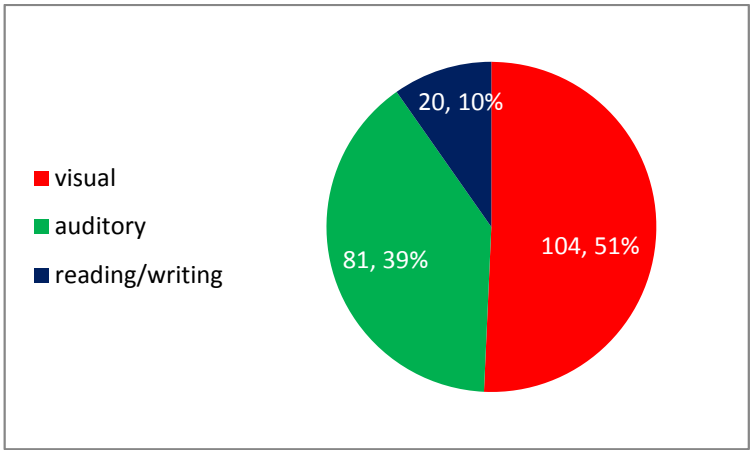


Table 6.36 Lesson Events Record for Class F on 7.1.2005 (Presentation a)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
						All the pupils pupils-7	All the pupils pupils-2	LD_VR-3	LD_VR-3		KW_VARK-4	KW_VARK-7	OT_VARK-8		
						All the pupils pupils-5		MI_K-3	MI_K			NN_K-7	OW_VARK -8		
						All the pupils pupils-6		KV_VARK	KV_VARK			NJ_K-7			
												KV_VARK-7			
												NL_VAR-7			
												JR_RK-7			
												LC_VRK-7			
												JT_R-7			
												MF_RK-7			

Conclusions from the Observation during Presentation a in Class F on 7.1.2005

When the presentation was working, all the pupils except for three girls LD (VR), MI (K) and KV (VARK)) listened and watched. When the teacher asked eleven pupils questions pertaining to the learning material, seven answered all questions correctly and two girls gave incorrect answers for one item only.

Date: 11.02.2005 Class: F Presentation_c

Presentation c included:

100 Visual events
42 Auditory events
6 Reading/writing events

These data are presented in the pie chart Graph 6.32 below

Graph 6.32 Events occurring in lesson with Presentation c, Class F (%)

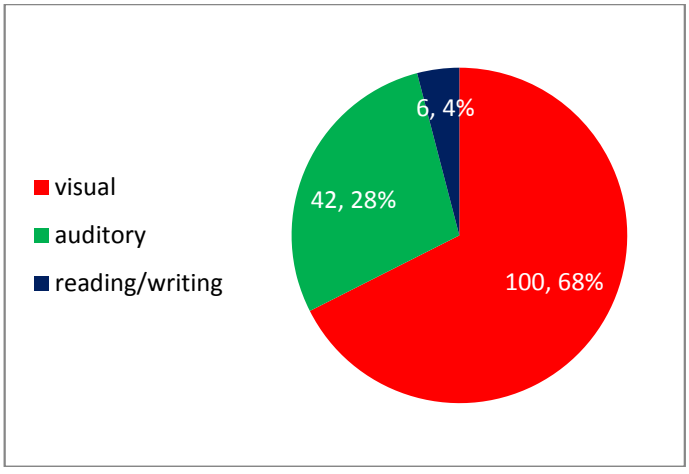


Table 6.37 Lesson Events Record for Class F 11.2.2005 (Presentation c)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils-5	MI_K-**27**	OP_VARK-**8**	KW_VARK-**10**		**All the pupils-11**	**All the pupils-19**		ME_K-**1**			OQ_VARK-2	KW_VARK-**4**	MG_K-**3**		
NL_VAR-**6**	ME_K-**27**	JT_R-10	KU_A-**24**		ME_K-**31**	LA_V-**20**		OS_V-ARK**1**			**All the pupils-18**	NN_K-**13**	OS_VARK-**15**		
NN_K-**6**	MI_K-**33**	NM_VARK-**10**	KW_VARK-**28**			**All the pupils -26**		KV_VARK-1				MI_K-**14**	NN_K-**16**		
All the pupils -22		ME_K-**21**	KW_VARK--**30**					ME_K-19				KW_VARK-**17**			
All the pupils -27		MF_RK-**23**	ME_K-**32**					MI_K-19							
All the pupils -33		JS_R-**25**													
CL_VARK-**7**		NM_VARK-**29**													

Conclusions from the Observation during Presentation c in Class F on 11.2.2005

In this lesson there were many events. The researcher saw that in the Reading/writing event and during the presentation all pupils were busy except for CL (VARK), NN (K) and NL (VAR). During the Visual event all pupils watched the presentation except for MI (K), ME (K), KV (VARK), and OS (VARK) who were observed during the Visual event as having no interest. The teacher asked questions, (an Auditory event) during the presentation, out of the pupils who were asked by the teacher, seven answered correctly and five answered wrongly. All pupils in the class did not listen, (Event 11).The teacher explained the subject matter and asked questions while the presentation was not working; three pupils answered correctly - OS (VARK), MG (K) and NN (K).

Three pupils did not know the correct answer; MI (K), NN (K) and KW (VARK), the rest of the pupils were busy doing other things.

Date: 25.02.2005 Class: F Presentation: c (2nd screening)

Presentation c included:

100 Visual events
42 Auditory events
6 Reading/writing events

These data are presented in the pie chart Graph 6.33 below

Graph 6.33 Events occurring in lesson with Presentation *c*, Class F (%)

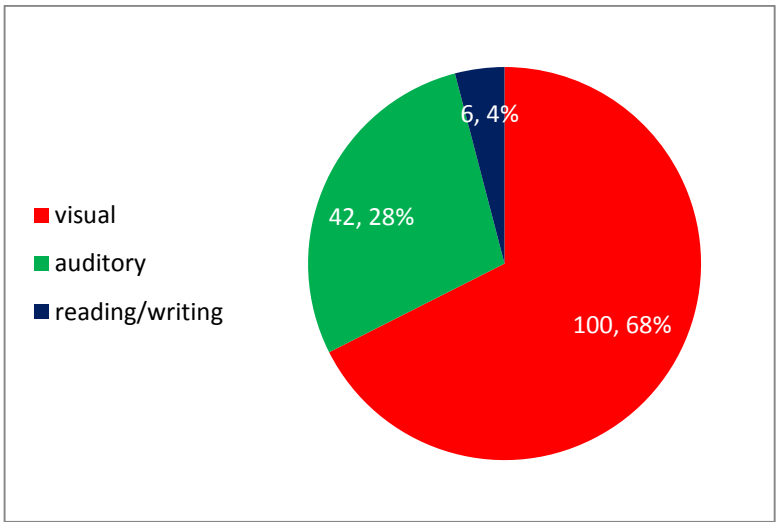


Table 6.38 Lesson Events Record for Class F 25.2.2005 (Presentation c)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils pupils-15		JS_R-**5**				**All the pupils pupils-4**		**All the pupils pupils-14**			**All the pupils pupils-11**	MI_K-**12**	MI_K-**2**	KX_VARK-**1**	
		LC_VRK-**6**				**All the pupils pupils-10**					MF_RK -**15**		NN_K-**3**		
		LD_VR-**7**									KV_VARK-**15**				
		LB_VARK-**8**									**All the pupils-10**				
		NM_VARK-**9**									MF_RK-**17**				
											KV_VARK-**17**				

Conclusions from Observation of Lesson Presentation c,Class F on 25.2.2005

While the presentation was working and the pupils showed interest in the task, they were active, listening and writing. In Event 14, all the pupils were still engaged with their tasks. The teacher, simultaneously, asked questions and explained and they were still busy writing so that they did not answer. While the presentation was not working and the teacher asked questions and explained, the pupils were busy doing other things. Two girls with learning styles: RK and VARK were talking. The pupils, who were asked, answered correctly and one answered incorrectly – MI (K) (Event-12).

Date: 18.03.2005 Class: F Presentation_d

Presentation d included:

122 Visual events
51 Auditory events
12 Reading/writing events

These data are presented in the pie chart Graph 6.34 below

Graph 6.34 Events occurring in lesson with Presentation d, Class F (%)

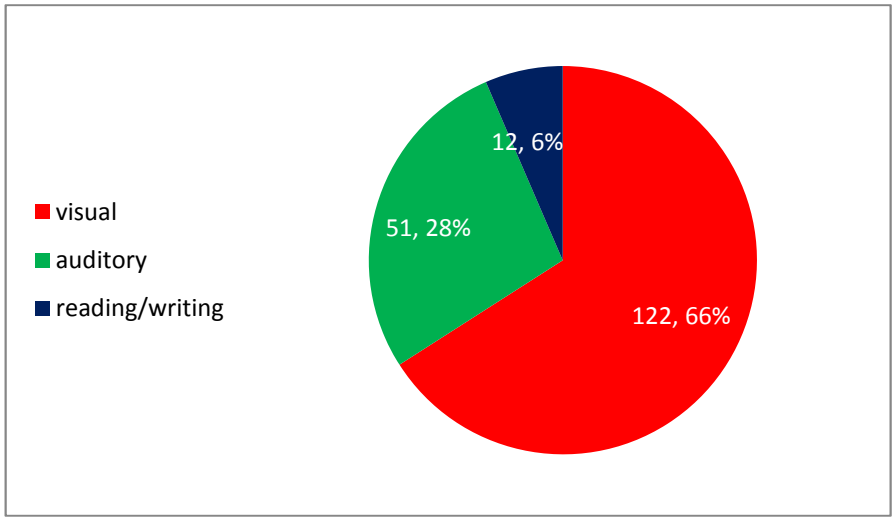


Table 6.39 Lesson Events Record for Class F 18.3.2005 (Presentation d)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
Not All the pupils7	NM_VARK-**12**	NN_K-**1**	JT_R-**4**		JT_R-**2**	**All the pupils pupils-8**		JS_R-**9**							
All the pupils 13		JS_R-**6**	KW_VARK-**5**		KW_VARK-**3**			KW_VARK--**9**							
		KW_VARK-**10**						JT_R-**9**							
								KV_VARK-**11**							
								OS_VARK-**11**							
								ME_K-**11**							

Conclusions from Observation during Presentation d in Class F on 18.3.2005

Short lesson due to a prolonged break. Some of the pupils were busy reorganising the books in the library. The presentation was working throughout the lesson while the teacher explained and asked questions concerning the presentation. Althea pupils in the class watched a Visual event except for JS(R), KW (VARK) ,JT(R), KV (VARK) and OS (VARK). The teacher asked questions and NN (K) KW (VARK) and JS(R) answered correctly. JT and KW were busy doing other things and they also answered a question asked by the teacher pertaining to the presentation incorrectly. During this lesson there were several interruptions: pupils, the books and a prolonged break.

Date: 01.04.2005 Class: F Presentation_e

During Presentation e included:

100 Visual events
43 Auditory events
18 Reading/writing events

These data are presented in the pie chart Graph 6.35 below

Graph 6.35 Events occurring in lesson with Presentation e, Class F (%)

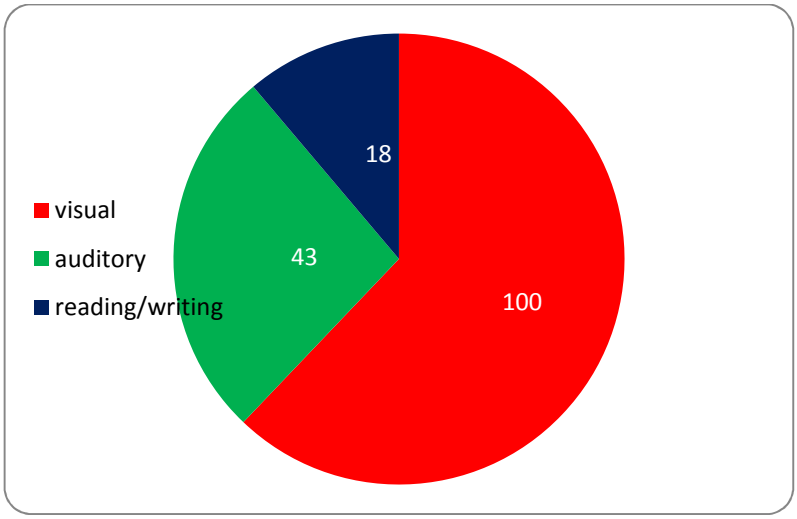


Table 6.40 Lesson Events Record for Class F 1.4.2005 (Presentation e)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task –R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils 12	KW_VARK **11**		KX_VARK **2**		KW_VARK **4**	**All the pupils-1**				LB_VARK **5**	**All the pupils 7**				
	JT_R **11**		OW_VARK **10**		JS_R **4**	**All the pupils-3**				OV_R **5**	OV_R **9**				
					JT_R **4**	**All the pupils-8**				JS_R **5**	KW_VARK **9**				
						All the pupils-12					JS_R **9**				
											JT_R **9**				

Conclusions from Observation during Presentation e in Class F on 1.4.2005

This lesson was taught by a substitute teacher (T.); while the presentation was working, it can be seen that the class watched the presentation and performed the Reading/writing task except for two pupils KW(VARK) and JT (R), Event 12; three pupils were busy doing other things while the teacher asked questions.

While the presentation was static, and the teacher was explaining and asking questions, it can be seen that none of the pupils were listening and they were busy doing other things, except for three pupils who participate in the teacher's activities: JS(R), OV(R) and LB (VARK).

Date: 20.05.2005 Class: F Presentation_f

During Presentation f included:

162 Visual events
46 Auditory events
68 Reading/writing events

These data are presented in the pie chart Graph 6.36 below

Graph 6.36 Events occurring in lesson with Presentation f, Class F (%)

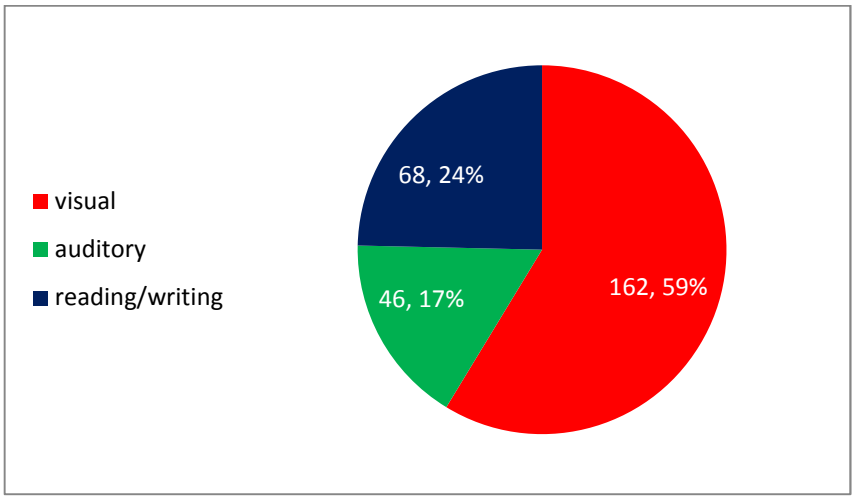


Table 6.41 Lesson Events Record for Class F 20.5.2005 (Presentation f)

The presentation was in progress										The presentation was inactive					
Executing reading and writing task -R		Teacher asked a question from the presentation				Presentation in operation				Teacher talked and explained		The teacher asked a question			
		The pupil she asked		The other pupils		The pupil responded		The pupil didn't respond		Pupil looked quietly or particip-ated	Pupil was busy with other things	The pupil she asked		The other pupils	
Performed the R task	Didn't perform the R task	Answered correctly	Answered incorrectly	Were quiet	Were busy with other things	Element V	Element A	Element V	Element A			Answered correctly	Answered incorrectly	Were quiet	Were busy with other things
All the pupils 2	KU_A 2	KX_VARK 3	KU_A 7								All the pupils 4		LZ_RK 1		
All the pupils 5	KW_VARK 2										All the pupils 6				
	KX_VARK 2														

Conclusions from Observation in Lesson using Presentation f in Class F on 20.5.2005

The presentation was working, the pupils are involved in a Reading/ writing activity, all were writing except for KU (A), KW (VARK) and KX (VARK), (Event 2). While the presentation is not working, the teacher explained and spoke however the pupils were not listening.

APPENDIX 7.1:
PROTOCOLS OF OBSERVATIONS OF KINAESTHETIC WORK

Introduction

A short explanation of Hebrew grammar rules ensues, elucidating terms used in the multimedia presentations

The Hebrew verb serves essentially the same functions as the English verb, but is constructed differently. Hebrew verbs have a different internal structure. Every Hebrew verb is constructed according to four characteristics: tense, person, three-letter root, and construct. Although the first two characteristics also appear in English, the three-letter root and construct are unique to Hebrew. Each construct has a certain pattern of conjugation and verbs in the same construct are conjugated similarly. The Hebrew verb assumes verbal meaning by assuming vowel-structure dictated by the particular construct's rules.

What is the active or passive form in English is formed in Hebrew according to the relevant construct. There are seven 'constructs': paal, piel, poel, nifal, hipal, hupal and hitpael, some are active forms: paal, piel, hipal and hitpael while the others are passive forms. Thus the active or passive form of a verb in English is formed in Hebrew according to the rules of the relevant construct. The constructs' system is relatively easy to understand and grasp; however it has numerous exceptions due to regular phonological effects like assimilation.

For example: the three-letter root for the verb 'close' is 'SGR', the verb infinitive 'to close' is 'LISGOR' and this is conjugated in the past tense and third person male to become: 'SAGAR' (closed) according to the rules for the construct 'pa'al'. Pupils were taught to recognise the verb in its different conjugations.

Most but not all Hebrew sentences have a subject as well as a verb, and possibly other arguments and complements. In this case, the word order is

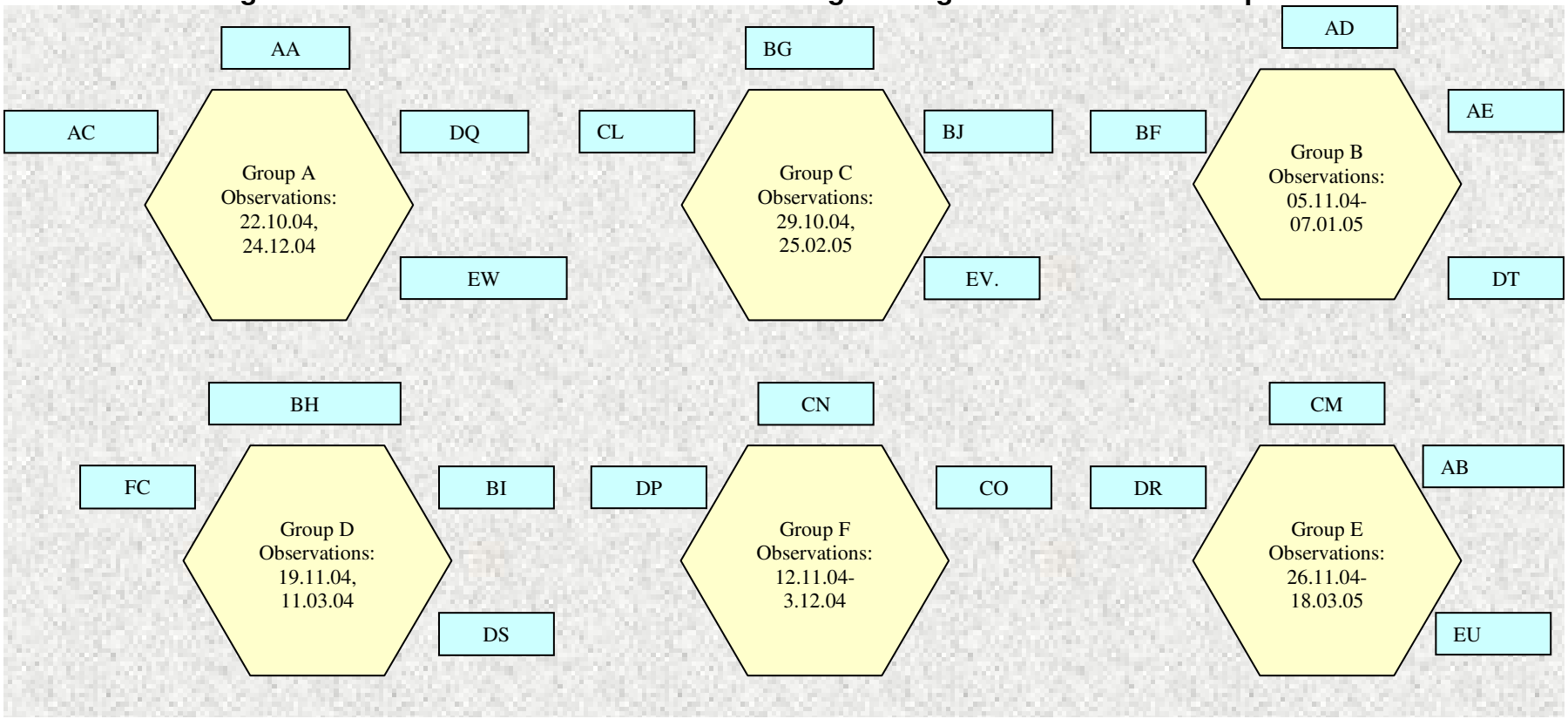
usually Subject-Verb-Object (SVO), as in English. However, word order can change in certain specific instances**.** In English grammar, the case of a noun or pronoun is a change in form that indicates its grammatical function in a phrase, clause, or sentence. For example, a noun may play the role of subject ("*I* kicked the ball"), of direct object ("John kicked *me*"), or of possessor ("*My* ball"). The Hebrew noun is inflected for number and state, but not for case and therefore Hebrew nominal structure is normally not considered to be strictly declensional. The pupils were taught to identify the same word when it was used in different roles (either subject or predicate or object) in the sentence.

Observations Findings for Class E-1

Description of the Classroom

As can be seen in Figure 7.2 below, in total there were 23 pupils. They sat in six permanent groups. Each week a different group was observed.

Figure 7.2: The Classroom of Class E1 showing Seating Positions of the Groups Observed



The Observation Process

This section details the observation process of the Kinaesthetic part of the lesson. The researcher observed the Kinaesthetic work of one group in each lesson. During the year each group was observed twice. The process began with the evaluation of the pupils' learning styles and continued with the recordings of the observations. The protocol below therefore includes the following details:

1. Results of the VARK evaluation tests for all the class' pupils.
2. The dates of the observations.
3. Records of the observations of each group according to the order of the groups.

Group A

Observed on 22.10.2004; Observed again on 24.12.2004

Name of pupil	Learning style	Sex
AA	K	Girl
AC	VARK	Girl
DQ	R	Girl
EW	R	Girl

22.10.2004

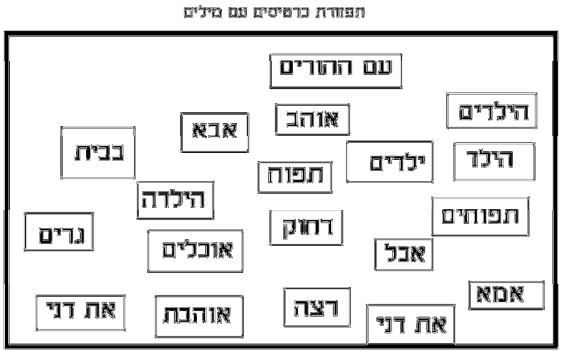
Kinaesthetic Task: The pupils cut cards out of a page in the exercise book; on each card a word was written. The task was to create meaningful sentences by arranging the cards in a logical order. Each pupil took several cards. They could perform the task individually or as a collaborative task between pupils, by exchanging and combining cards (see Figure B below).

At the second stage the activity involved different actions concerning each sentence.

Figure B

An example of correct order

Cards spread over table



The Observation

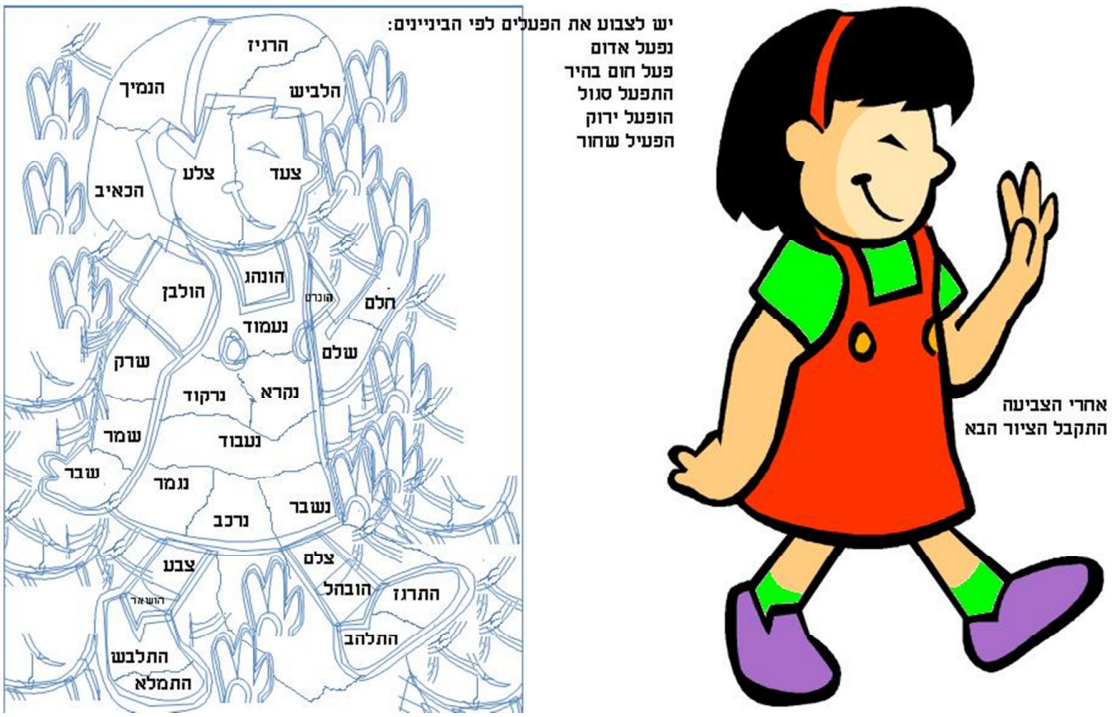
AA leaves her place, passing between the pupils and asking for scissors. AC asks her: *'Do you want to work together with me?'*AA shrugs her shoulders: *'No. just give me a few minutes with your scissors*'. AC gets up, turning her head to the side: *'I'm busy let me work quietly'*. AC cuts out the cards. She places them on the table. She moves the cards from place to place. She doesn't manage to construct a sequence of sentences. She rests her head on the table, looks at EW and says: *'I can't do it! Everything's upside down! What a mess!'* EW does not answer. AA plays with her pencil. Suddenly she gets up and takes AC's cards, and puts them in the correct order. AC smiles: 'Great, we'll work together'. She gives AA her scissors. Until the end of the lesson they both work quietly. They do not talk to one another, but they arrange the cards together.

EW still hasn't begun to cut. She marks numbers beside each word. Paz L. works by herself, cutting and pasting and does not look at the work of the others. EW begins to cut the cards, but she does not arrange them into sentences. Some of her cards fall and she pushes them under the table with her foot. She mumbles something to herself without looking at the others: *'I don't like jobs like these. I've got no patience for cutting and pasting. What's the time, when will they ring the bell?'*

24.12.2004

The Task: Different verbs are written on spaces in a jumbled sketch. Each verb has to be shaded with a particular colour that corresponds to a particular construct. If the verbs are correctly coloured then a picture is revealed that was hidden under the jumbled sketch (see Figure C below).

Figure C: The Jumbled Sketch



Jumbled picture with verbs conjugated by construct

Picture produced if constructs coloured correctly

<u>The Observation</u>

EW begins to colour the parts of the drawing. All the other girls in the group laugh; they cannot identify the common construct for the two cut-outs on which the verbs are written. EW is silent, the girls continue to laugh. EW says: *'Ouf, its annoying me, I really have to make efforts to make it come out correctly, I don't understand why its so difficult to reveal the construct'.* AA gets up and puts a hand on EW's shoulder: *'that's enough! I couldn't stop laughing. Perhaps you'll try to explain it to us; perhaps it will actually be good for you'.* AC bangs her hands on the table, EW

sits down and looks at the cards on which the drawing is sketched, suddenly she gets up and says quietly: *'I'm sure I'm right, let's ask the teacher*'. DQ moves her hand *'Ouf! I just wasted my time, we know that you're the one who is really good at it'*. EW: *I'm going to the teacher to let her check it'*. The girls paint and say to EW: 'Well *done, you were right'.* This is collaborative work. DQ gets up: *'Now it's my turn, this is my opportunity to do something that I like'*. EW points to two more verbs and says: *'they both belong to the construct 'hitpael'* [the Hebrew name for this group of verbs]'. The girls help to do the colouring, DQ says its fine: *'I think that it's a painting of two monsters dancing'.* EW smiles at DQ revealing another two verbs that belong to the same construct. DQ says: *'It's actually nice this is the first time I have succeeded with this task* '.

Group B

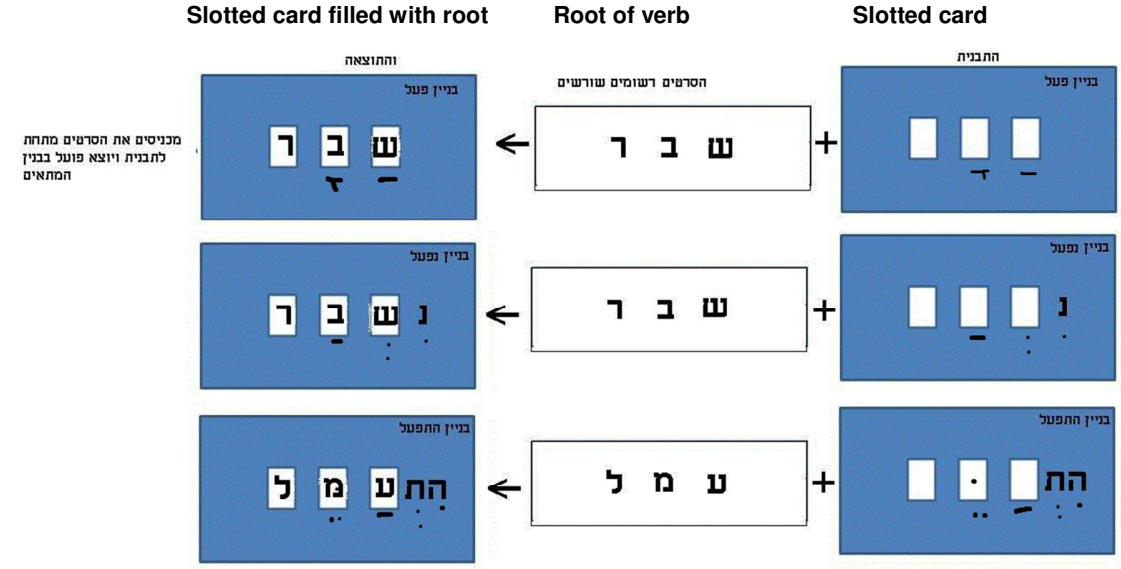
Observed on 5.11.2004 and observed again on 7.01.2004

Name of pupil	Learning style	Sex
AD	AV	Girl
AE	AR	Boy
BF	A	Boy
DT	AV	Boy

5.11.2004

The Task: Pupils cut pieces of cardboard to create cards with slots appropriate for the form of a particular construct. The pupils then prepare a strip of paper with verbs that are appropriate for these constructs. Then they insert the paper strip behind the card so that the letters of the verb fit the slots on the card (see Figure D below).

Figure D



The Observation

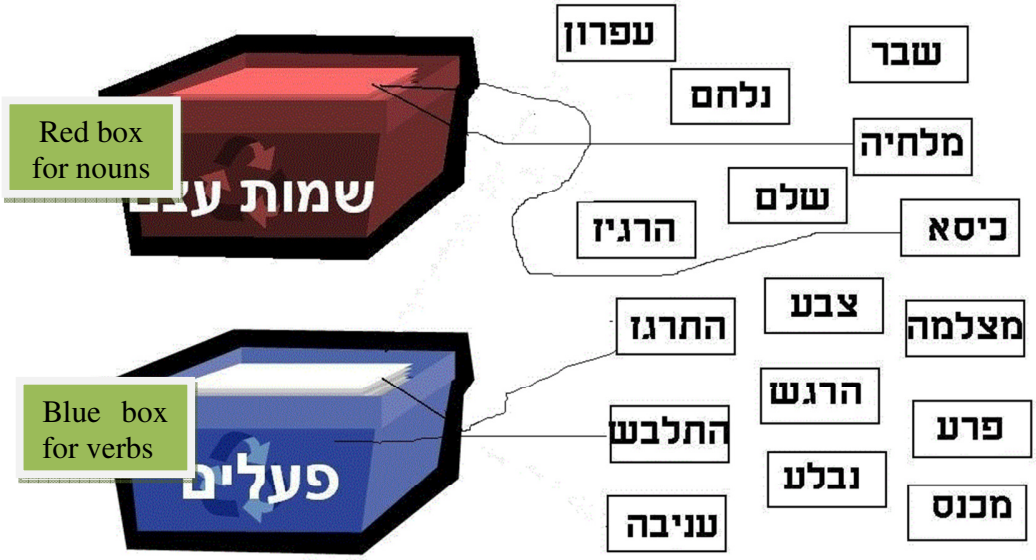
The group's members look at the cards detailing the instructions regarding the task. None of them begins to cut, AD reads the verbs from the cards out loud, and AE turns the cards for her and says out loud: *'Enough! We've understood, let's start to cut'.* BF puts his hands on his ears and says *'Its not nice when you shout, first of all we all understand, you're shouting, and I don't like this work at all, just don't ask me for help as you always do'.* BF turns to him*: 'You're just annoying! I don't think that you can help me at all'.* DT gets up and distances them one from the other with his hands: *'Stop it, be serious, it's not difficult, I'm sure we'll succeed'.* AE looks at BF who is cutting the pieces of cardboard crookedly and sticking them in an incorrect sequence. He points to the mistake and talks to BF: *'What are you doing? You always do everything contrarily'.* DT gets up from his place, looks at BF's work, smiles and says: *'In my opinion, you've got it wrong'. Perhaps you'll look at mine'.* AD approaches them: *'if you want, you can try my method'.* Now everyone is quiet, cutting and pasting apart from BF. AD looks at him and asks him: *'do you want us to help you'.* He sighs out loud and says: *'if you want to, perhaps it would be useful'.* DT goes over to him and says: *'You remember that I told you to pay attention to the beginning of the word. Don't worry*

we can help you'. He whispers something and says: *'I know, but not everyone wants to help'.* DT and AD help BF with the cutting out, and he sticks the pieces in the places that they show him.

7.01.2005

The Task: Sorting cards on which verbs and nouns are written. The pupils have to identify verbs according to the criteria that they have learnt. The cards with the verbs on are placed in the blue box on the right and the nouns in the red box on the right. The work is collaborative. The second stage necessitates placing the verb cards on a surface and placing thin strips of cartridge paper between the verbs that belong to identical constructs. Building the boxes for construct identification at the top of the cards and sticking the verbs from that construct there (see Figure E below).

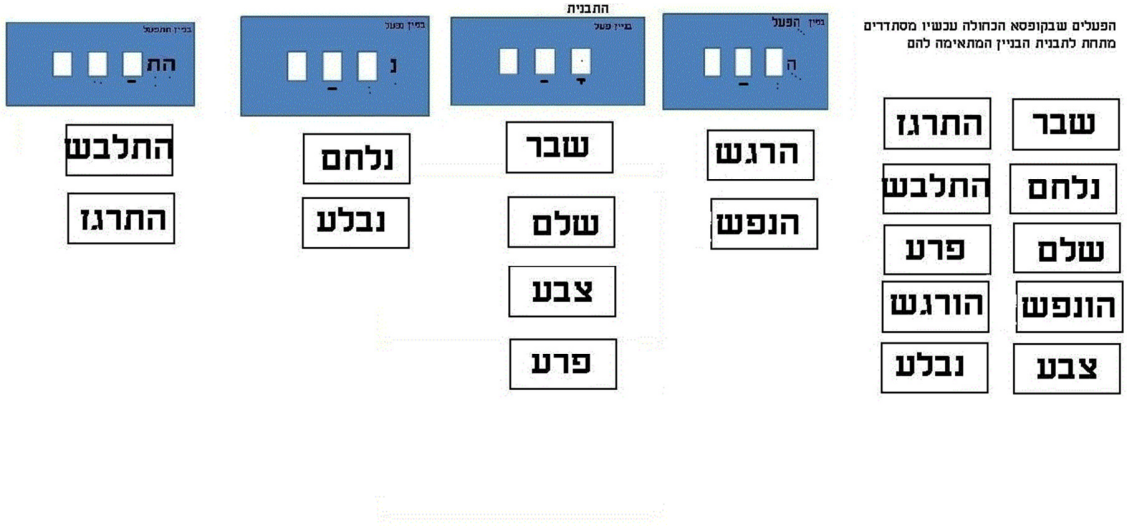
Figure E



The second stage necessitates cutting out cards with slots for construct identification. The cards with the verbs are then placed on a surface in rows under the appropriate construct cards and thin strips of cartridge paper are placed between the verbs that belong to identical constructs. The verbs that belong to the construct are stuck under the slots of the construct card (see Figure F below).

Figure F

Verb cards arranged under relevant construct card **Verb cards**



The Observation

AD scans the cards with her eyes looking for verbs.

AE begins to read the verbs out loud. BF looks at him: *'what are you doing, maybe you'll explain what needs to be done?'* AE: *'we need to put the verbs into the blue box'.* DT: *'I think that it's really worth reading the cards out loud'.* AD looks at AE: *'O.K. I'll read the cards out loud'.* DT says*: 'Right, that's important, then we can pay attention and understand whether the word is a verb or not'.*

The pupils in the group look at AE, he reads and they shout 'yes' when it is a verb. It is difficult for them to sit still and they begin to move and put the cards in place, and AE shouts: *'what are you doing? There's a mistake here'*. DT picks up the cards: *'what on earth is this word here, I don't know it, how can I know whether it's a verb?'* BF says: *'so why don't you ask? Why do you put it there without checking?'* AD: *'wait a minute he might be right'.* AE snatches the card, goes to the teacher and asks whether the word is a verb. He hops back to the group. *'The teacher said I'm right, it's not a verb at all.'* DT takes the card from him and puts it in the appropriate position. DT says: *'there's no alternative. If we don't know the word we have to ask the teacher'.* BF places his hand on his forehead and sighs:

'Ouf! This work takes a lot of time, usually we have easier work'. AD brings the blue box closer to her, smiles, looks at BF and smiles: *'No need to worry, meanwhile everything is correct'.* BF takes the box from her: *'Can I see the cards? Are you sure there's no confusion here? Something doesn't seem right to me. I think that this here is not a verb'.* AE gets up and says: *'it's best to ask the teacher'.* DT: *'but I think it's actually a verb'.* DT takes the card and runs to the teacher. He comes back with a smile: *'I told you'.* In the last part of the lesson they work quietly.

Group C

Observed on 29.10.2004 and observed again on 25.02.2005

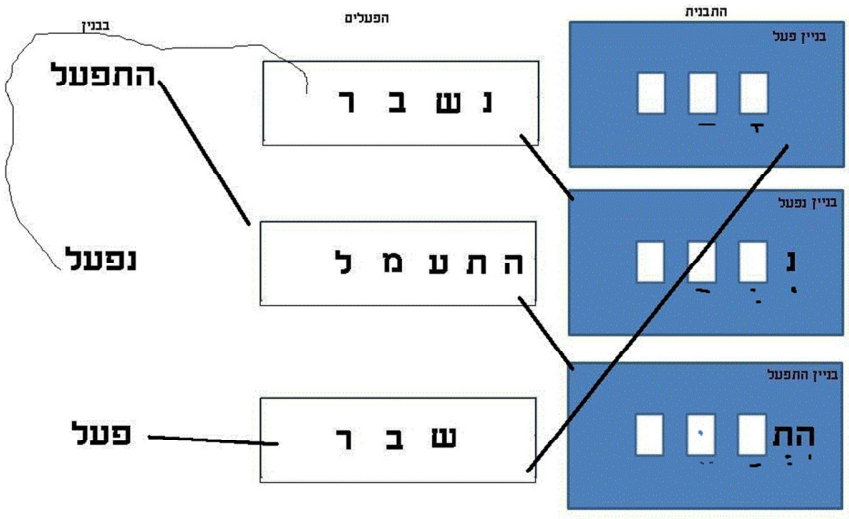
Name of pupil	Learning style	Sex
BG	K	Girl
CL	RK	Girl
BJ	K	Girl
EV	VA	Boy

29.10.2004

The Kinaesthetic Task: identification of constructs according to slotted cards – drawing lines from the verb to the appropriate slotted card and to the appropriate construct name. This is individual work (see Figure G below).

Figure G

Name of Construct **Verb form** **Card slotted for Construct**



The Observation

BJ looks at BG who is working quickly, she peeps at Mor's exercise book, BG pushes her a little and says*: 'what are you trying to do? Do you want to copy from me?'* BJ smiles: *'I have to succeed today, what can I do in order to be sure that I solve it correctly?'* CL looks at them both: *'Try to match the root with the slotted format, like this you see; if the verb is in that construct'*.

CL shows BJ how to identify the construct. She draws the slotted format on the page, smiles at BJ and says: *'I hope that you understand!'* The girls complete the task and now they wait for EV, from time to time he turns his head and tries to see how BG has solved the task. BG hides her work. She looks at him and says: *'It's high time that you finished your work by yourself'*. CL smiles at him: *'I just hope the teacher doesn't make us explain to you again and again'.* EV jumps up from his place: *'I don't need any favours'* and then he sits down and works quietly. Suddenly he gets up from his place and goes over to the teacher with his work. The teacher smiles at him and tells him that he's completed the task successfully. *'Great!'* he exclaims happily. *'Now no-one can say anything'*. All the members of the group work quietly.

25.02.2005

The Task: Preparing films –drawings prepared illustrate particular uses of a word. The pupils need to distinguish words that serve in one sentence as the subject and in another as part of the predicate. For example: 'The pupils ***run*** after the ball' and 'The muscular ***run***ners sat down to rest' and to draw suitable pictures to illustrate these uses for the film (see Figure H below).

Figure H

Pictures drawn by the pupils to illustrate different uses of the word

The Observation

BJ rests her head on the table. She closes her eyes, and bangs her hands on the table. CL draws the first picture of the film. Moor points to the page and says to CL: *'You didn't understand the instructions, we have to think about different sentences with the same word, sometimes it's the subject and sometimes it's the object'*. CL smiles: *'It's not terrible, it's not so difficult'.* EV intervenes in the conversation he puts his hand on their pages and says: *'Perhaps first we'll compose all the sentences that could be suitable'.* BG laughs: *'what' for, its just unnecessary work'*. EV shakes her head: *'you have to understand, it's important, seriously'.* CL looks at everyone and says: *'Its more fun if we all work together, that way we can help and also finish the task more quickly. Perhaps it's worth using a different colour to mark the subject and another colour to mark the object like they*

had in the presentation. Good, then I'll begin'. CL shakes her head: she looks at the page in Mor's hand, BG moves it. She looks at him accusingly: *'That's enough, move you're interfering with my thinking!'* BG suddenly stands up and says: *'let's vote whether it's worthwhile working together or individually'*. BG stands up straight: *'Who wants to work together?'* Everyone votes for it. *'Good then I'll begin'.* CL shakes her head: *'no you always have to be first, you just want to be in control. The goal is that we should work together. Each one in their turn will choose the next picture and will also suggest suitable sentences'.* EV yawns: *I'm tired; I can't manage so well to compose sentences like these. I feel that I'm not helping'.* CL pushes him gently*: 'Enough, stop your nonsense and begin to work'.* Now they all work quietly for five minutes, each one manages to compose two sentences according to the instructions and passes the page to the person after them and they begin to draw suitable scenes. BG raises her hands and stretches: *'I love working together!'*

Group D

Observed on 19.11.2004 and observed again on 11.03.2005

Name of pupil	Learning style	Sex
BH	VARK	Boy
BI	R	Boy
DS	K	Boy
CK	R	Boy

Kinaesthetic Task: Construction of a chain of paper strips. On one strip of paper the pupils write: the verb root, time, person and construct and they have to join the strip of paper to an additional strip of paper on which the infinitive form of the appropriate verb appears, for example, the verb 'dress': time = present; person = they; construct = 'hitpael' [intransitive and reflexive verbs]. They have to fix this strip to a strip on which the infinitive form of the verb: 'to dress' appears. Together the two strips form the chain of the particular verb. Each of the pupils picks a strip

and tries to match it to another strip. In the end the group's cooperative work joins all the pairs of chains into one long chain (see Figure I below).

Figure I

Chain pair – verb strip + characteristics strip

Observation

BI brandishes his pencil like a pendulum in front of BH's eyes.

DS pushes BH's hand: *'what's happened to you, come on let's start working'.*

BI sighs heavily: *'I'm beginning to read the strips, but I can't find the strip with the appropriate verb'*.

BH, BI and CK take strips from the box and hand them to DS each time that they manage to fix two appropriate strips together. DS organises the chain. He waves the long chain. BH turns to the box and delves into it: *'I can't find a suitable verb for my strip'*. He looks at the strip of paper in CK's hand, *'hey, you've got it!'* They both give the strips to DS and DS continues to form the chain.

11.03.05

The Subject of the Lesson: The same word fulfils different roles; it may be either a subject or an object.

The Kinaesthetic Task: Pairs of sentences appear on cards. On each of the pair of cards the same word appears, on one card in the role of the subject and on the other card in the role of the predicate. The pupils have to colour the subject in blue and the predicate in red (see Figure J below).

Figure J

Sentence cards – in upper row the sentences before the work

In lower row pupils have marked nouns in blue and verbs in red

The Observation

Everyone works quietly in their exercise book. BH looks at CK's cards and compares them to what he has written. He looks at CK and says: *'I understand it so far, I only had one mistake".*

BI closes the exercise book. *'I'm not sure that I'll manage to solve this alone'.*

BH goes over to him, touches his shoulder: *'don't worry, it's not a problem. Every time you need help I can help you'.*

BH bends over BI's exercise book. CK moves with him, *'Stop it, be careful you mustn't move me!'* DS and CK work together on the same card. CK puts his hands on the card and moves it: *'that's it we've almost finished'*. DS pulls the card towards him: *'That's enough, now we've just got to mark it as the subject below.*

Give me a colour, I'll colour what you forgot below and you can continue to work on the upper part'. BI plays with a pencil and doesn't work on the cards. The pencil falls beside the cards of CK and DS. CK takes hold of the pencil and looks at BI: *'you keep on interfering with us while we're colouring the subject'.* BI laughs but moves from there and returns to his place.

DS puts the colours back in his pencil case: *'That's it, now everything is marked, you can see that I succeeded'*. DS looks at BI's card: *'why aren't you doing the second task?'* BI shakes his head: *'there's no need for it, it's the same work'.*

DS grabs BI's hand: *'Wait, let me do it'*. He begins to colour, working well without mistakes. It is now quiet in the group, each of them works alone. BI looks continually at DS's card, but continues to perform his own task. DS goes over to him: *'now I'll check that you haven't made a mistake'*. The bell is heard and they all go out for the break.

Group E

Observed on 26.11.2004 and observed again on 18.3.2005.

Name of pupil	Learning style	Sex
AB	RK	Girl
EU	VARK	Boy
CM	VA	Boy
DR	R	Girl

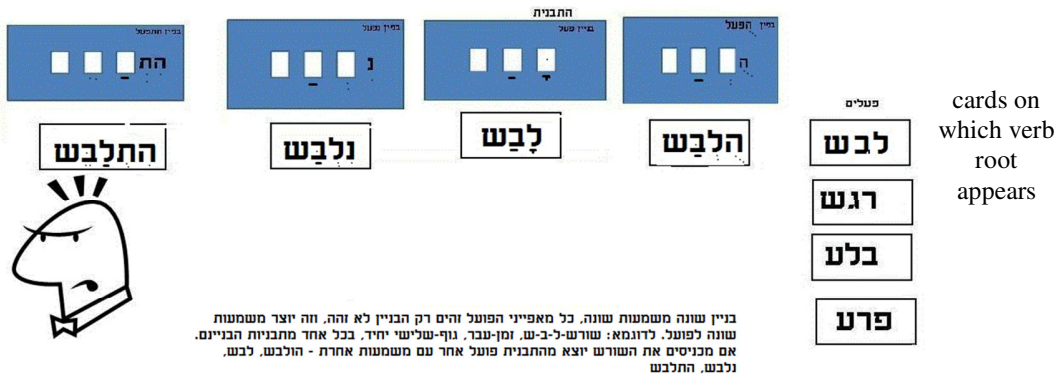
26.11.2004

The Kinaesthetic Task: Construction of slotted pages suitable for the different constructs, either on a sheet of cardboard in which windows are cut or from a series of matchboxes. The different verb roots appear on small cards

The cards with the different verb roots are then slotted into appropriate construct on the slotted page and the pupils discover that in a different construct the verb has a different meaning (see |Figure K below).

Figure K

Slotted cards representing the constructs



Preparation of groups of drawings for each root, each one showing a different meaning of the verb.

The Observation

AB takes five boxes of matches, and covers them with white paper. DR looks at her: *'perhaps you can explain what you are doing?'* AB shows her the container that she has made: *'you'll also find it useful to prepare a similar container'*. DR looks at AB's work: *'yours will be fantastic! Perhaps we'll work together'*. AB: *'I'm satisfied with my result, why don't you try to prepare it by yourself'.* EU comes up to them: *'I like doing work like this'.* Without talking they continue to build the containers. DR looks at them and says: *'AB's container is better, she wrote the letters clearly on the container'*. DR looks at EU's containers without saying anything. The pupils continue to work quietly.

18.3.2005

The Task: Each pupil in turn performs a one-minute pantomime, each of the members of the group writes down information that appears in the pantomime on a card and punctuates their writing. They exchange cards between them and each one criticises the card of the pupil to their right.

Observation

DR reads the task out loud and the other members of the group listen. AB taps her pen on the table: *'perhaps I should begin, I have an idea'*. She gets up from her place and performs a short pantomime. EU claps his hands: *'I think that was perfect, I have an idea for a suitable sentence'*. AB interrupts: *'perhaps each of us will give a sentence, and we'll choose the most successful sentence*'. CM breathes in noisily, shaking his head angrily from side to side: *'I'm not sure that's worthwhile, it's a waste of time'.* DR nods. CM smiles. AB looks at CM: *'You're just a coward, its obvious that you've got no self-confidence*'. CM gets up from his chair, DR motions with her hand that he should sit down: *'on the one hand its more interesting if each one suggests a sentence, but on the other hand arguments will start and I don't have the strength for that'*. EU doesn't participate in the argument; he writes a sentence on a page, AB snatches the sentence from him and gives it to DR, she reads the sentence out loud, EU looks at DR with an inquisitive expression: *'what do you think?' 'I don't mind saying that it's a wonderful sentence, go on let's use it and that's that'.* They all put their heads down and write the sentence. EU. leaves his place. DR: *'hey where are you going, we've reached the last stage, and we have to punctuate it'.* EU comes back, his face angry, he sits down but doesn't continue to work.

DR holds the page out for him with the punctuation that she has added. Without speaking he takes an eraser, erasing and correcting the punctuation that she has made. DR looks at the pages of AB and CM and smiles at EU saying: *'I've got a surprise for you. You got it wrong and it's actually I who solved it correctly. Look everyone agrees'.* EU makes a negating gesture: *'I think that I'm all mixed up in my head, I've forgotten how to punctuate, I think yours is correct'*. CM looks at the clock: *'Aren't you going to stop arguing, we've got no chance of completing this task. I'm feeling disappointed. When is my turn, I've got an idea for a fantastic pantomime'*. The bell ends the lesson.

Group F

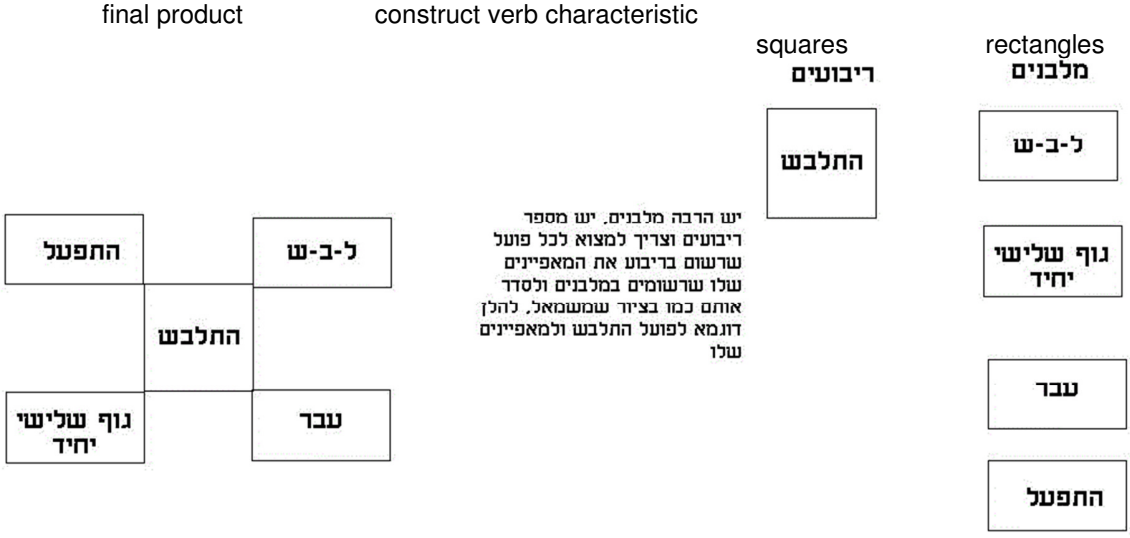
Observed on 12.11.2004 and observed again on 3.12.2004.

Name of pupil	Learning style	Sex
CO	K	Girl
CN	K	Girl
DP	K	Girl

The Subject of the Lesson: Identification of Verbs and Constructs

The Task: a number of squares are distributed on a worksheet, on each square is written a verb root. These verb roots must be matched with four rectangles on each of which appear one of the four different forms of the verb (time, person, construct and root). The rectangles are cut out of an exercise book. The pupils are asked to match and paste the correct rectangles on the sides of the appropriate square. Each pupil can work alone (see Figure L below).

Figure L



The Observation

CO sits in her place. She takes a paper napkin and cleans the table. She places the exercise book on the table. CN takes the napkin from her and cleans the area near her; she gets up and throws the napkin into a bin, sits down and rests her elbows on the table. CO opens the exercise book and studies the task instructions. DP yawns and stretches. CO continues to leaf through the pages in the exercise book. DP smiles; she still sits without opening the exercise book, quietly observing her friends in the group. CN goes up to the teacher and the teacher tells her to try again. She collapses into her chair, and cuts the rectangles. The rectangles are scattered around her. Some of them are slightly torn; she scrunches some of the rectangles, like a ball and throws them. She looks at CO angrily: *'That's enough, I'm fed up'* .CO straightens CN's wrinkled rectangles: *'Hey wait a minute, what's happened? Perhaps we can easily solve the problem, if we work together?'* CN giggles: *'Easily you say! Let's see you do it'*, she puts a rectangle on one of the sides of the squares. CO gets angry, *'Can't you see that that doesn't fit?'* DP comes closer to her, looking with concentration at the rectangle and the square; she chooses one rectangle that CN has cut out and places it instead of the previous rectangle. CO scrunches the rectangle angrily and says: *'you see you don't understand the work'*. DP straightens the scrunched up rectangle. The three pupils again look at the rectangles that CN has cut out, DP puts all the appropriate rectangles around the square. CO jumps up joyously: *'Wonderful, we've finally got a correct solution!'*

DP cuts out rectangles and places a rectangle next to the square. CO glances at DP's work, moving the rectangle to another place, they divide up and again each one works alone. DP turns to CN: *'give me your scissors'.* CN pushes her hand away: *'wait a minute, I need to cut out more rectangles. How many rectangles have you cut out so far? Bring me your glue'*.

Now CN gives DP the scissors. She stops working. She looks at the way DP cuts out her rectangles. DP takes some of the rectangles and puts them next to the side of the square in the exercise book. Now she changes it, correcting something. CN snatches one rectangle from her. DP is annoyed: *'Don't take*

control over my work!' CN looks at how DP is doing the work and again tries to take her rectangle. DP looks at her with a smile: *'that's enough, don't take my pieces, do you want me to explain what you have to do?'* CN reads the task out loud again and asks DP: *'can I have the scissors at all?'* DP nods her head.
CN finishes her cutting of the rectangles and gives the scissors to DP. Now each of the girls works independently. There is no cooperation. DP again looks at CN's work. She finishes cutting out the rectangles. She points at a square and asks: *'What construct is that verb from?'* She takes a colour and colours the square. She rests her head on the table. She looks at how the others are doing their work. She looks out of the window and then she puts the rectangles beside the sides of the square, working continuously: *'that's it, I've finished'* she says out loud and looks at CO: *'Can you check that I've done it correctly?'* CO looks and moves the rectangles to the correct places: *'now you need to paste the rectangles'*. DP smiles at CO: *'it's good that you helped me'*. DP looks at CN's work. She points to some of the rectangles: *'what you have done is no good'*. CN gets up from her place and goes to see what they have done in another group; she comes back to her place then gets up again. CO turns to her saying: *'sit down quietly already!'* CN lifts her head: *'one minute, no two'*. She looks for the glue in her pencil case. CO completes her work and rests her head on the table. The other two girls continue to work quietly. Again CN peeps at CO's work, CO moves her work towards her, *'let me help you, have you forgotten how to find the construct?'* She takes a page and explains things to her out loud. CN plays with her colours in her pencil case, then playing with the sharpener, she throws it into her pencil case and asks CO: *'Where should this rectangle be placed?'* CO directs her to the correct position. CN reads out loud the elements that she has added to the square; she looks at CO. CO pushes her lightly: *'Go on, you'd better get on with the work'*. DP finishes putting all the rectangles around the square and takes colours and colours the words.

3.12.2004

The Subject of the Lesson: verbs in passive constructs

The Kinaesthetic Task: each group receives a hard sponge cube, a card circle and blocks stuck to a wooden toothpick. Each circle is perforated with four holes and a passive verb is written in the centre. Additionally there are pieces of cartridge paper with petals drawn on them, each petal is perforated and they are attached to paper fasteners.

The Task: to cut out the petals, to write on each of the petals one of the characteristics of the verb that fit the verb written at the centre of the white circle, and to join all the petals with the help of the paper fasteners to the centre of the flower (the circle) to create a beautiful flower. At the end of the process this flower is attached to the toothpick with the blocks and stuck into the hard sponge cube (see Figure M below).

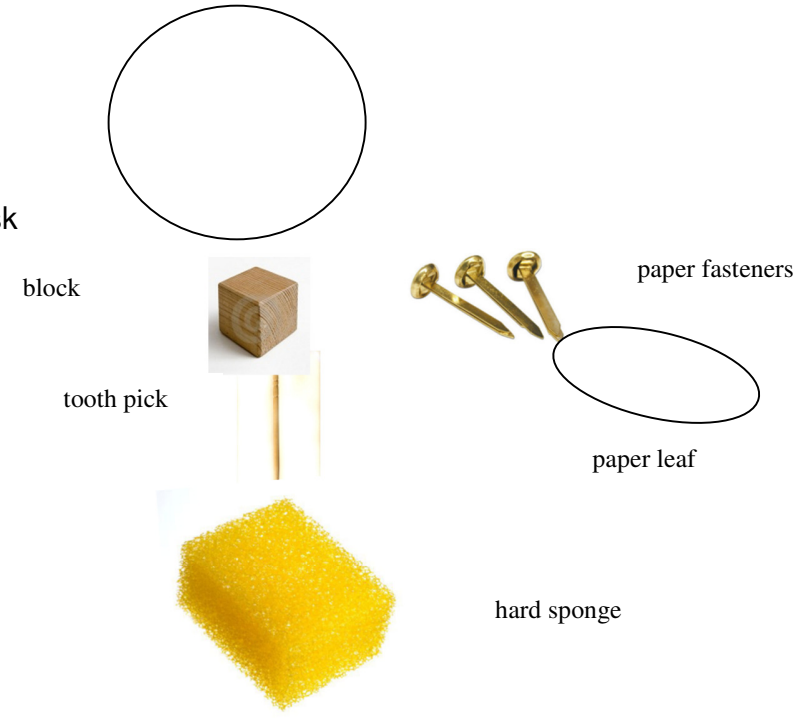
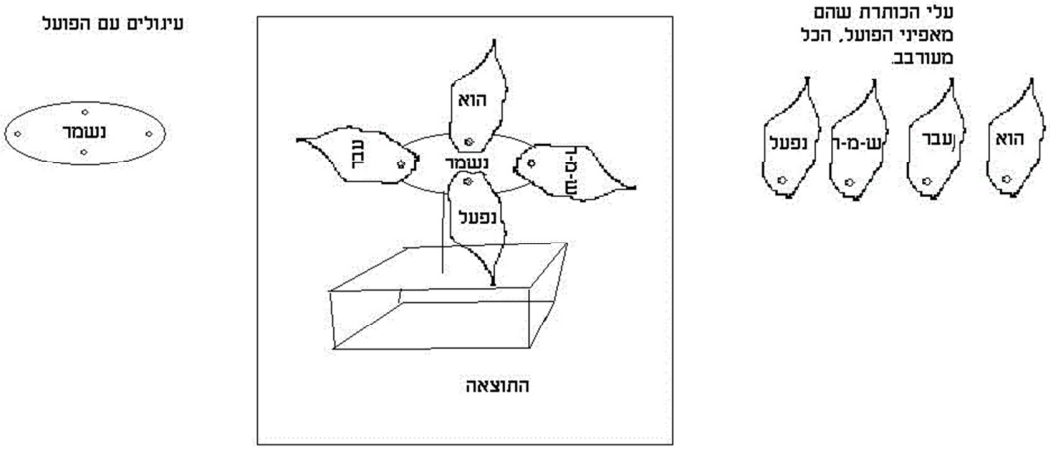


Figure M: The flower task

Circles with verb Completed flower Leaves with verb characteristics



The Observation

In the group work CO takes out scissors from her pencil case and begins to cut out the petals. DP sits on her chair leaning backwards and takes a deep breath. CO turns to her and says: *'I suggest that you help me to cut out the petals'*. She gives her some coloured cartridge paper. DP seems unperturbed: *'don't tell me what to do. I'll begin to write on the petals on which you have written the verb's characteristics'*.

She takes a toothpick on which a white circle is stuck and reads the verb out loud. She takes four petals, which CO has already cut out. CN looks at both of them. She does not try to help. DP looks at her. She gives her the paper fasteners: *'you have to help us to finish the task, there's a lot to do'*. CN plays with the paper fasteners. DP pushes the petals with the writing towards CN: *'I don't understand why you're hesitating, you always do whatever you fancy, this is group work'*. CN attaches the characteristics of the verb to the circle and puts the flower into the sponge. CO smiles: *'Great! Do you want to help me to cut out the petals or do you want to help DP?'*CN is silent, she takes the petals which DP has written on and attaches them to the white circle. She shows it to CO: *'look did I match them up correctly?'* CO nods that it is correct. CN takes the completed flowers and sticks them into the hard sponge. CN looks at the other groups, she comes closer to CO

and DP and whispers: *'we're ahead of everyone, come on let's hurry'*. CO picks up the sponge with the flowers: *'How beautiful!'* DP straightens the flowers and says: *'Well its no wonder, we're the champions!'*

Observations Findings for Class E-2

Description of the Classroom

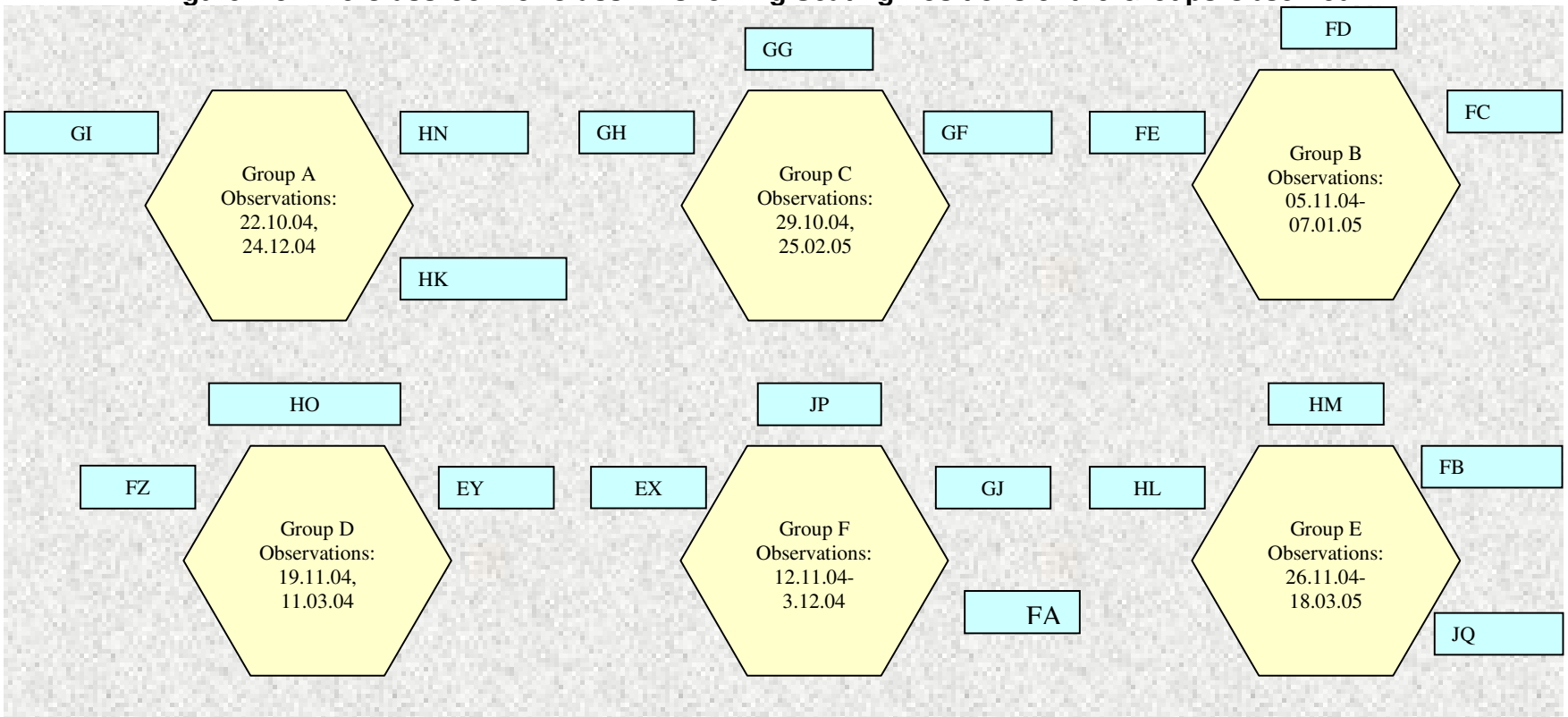
As can be seen in Figure 7.3 below, in total there were 20 pupils in this class. They sat in six permanent groups. Each week a different group was observed. (see Figure 7.3 below).

The Observation Process

Like the previous section, this section details the observation process of the Kinaesthetic part of the lesson, the researcher observed the Kinaesthetic work of one group in each lesson and during the year each group was observed twice. The protocol of the observation includes the following details:

4. Results of the VARK evaluation tests for all the class' pupils.
5. The dates of the observations.
6. Records of the observations of each group

Figure 7.3: The Classroom of Class E2 showing Seating Positions of the Groups Observed



Group A:
Observed on 22.10.2004; and observed again on 24.12.2004.

Name of pupil	Learning style	Sex
HN	VAR	Boy
HK	VAK	Boy
GI	VARK	Boy

22.10.2004
The Kinaesthetic Task: The pupils cut cards out of a page in the exercise book; on each card a word was written. The task was to create meaningful sentences by arranging the cards in a logical order. Each pupil took several cards. They could perform the task individually or as a collaborative task between pupils, by exchanging and combining cards.
At the second stage the activity involved different actions concerning each sentence.
<u>The Observation</u>
HK reads the instructions out loud. He gives HN the scissors and asks him to cut out the cards. HN holds the scissors and waits until HK finishes reading. He looks at the small cards: *'It's very difficult for me; I don't know exactly how to do it'*. He moves the scissors towards GI: *'You try it'*. *'Definitely not, I don't want to!'*
HK looks at GI: *'you're also working with us in the group – instead of interfering start to cut out and read what is written on the cards'*. HN turns the scissors in his hands: *'the letters are too small for me; you really need a magnifying glass to be able to decipher them'*. HK demonstrates how he should do it and asks if everything is clear: *'afterwards we'll move them and try to construct sentences, I'm sure you can do it'*. HN nods his head; he cuts out the cards and spreads them over the table.
HN*: 'now I don't understand what to do'*. HK comes closer to him and says: *'come on let's construct the sentences'*. GI pushes HK and says: *'it's not so simple'*. HK shakes his hands and says: *'give me that card and move the second one to the beginning of the sentence'*. HN tries to snatch the card

before HK touches it. HK lowers his head: *'I think that each of us should try at least one sentence, using that method we are all pressed and it's difficult for us'*.

HN smiles to himself; he puts the card in the appropriate place: *'perhaps you'll wait a bit; I think we've completed one sentence. Now we need to mark the verb'*. GI takes the red marker and emphasises the verb on one of the cards. HK pulls the card from her: *'you're wrong'*. HN makes an effort to laugh: *'never mind it's not terrible'*. HK takes the marker and bangs it on the table. HN stands up, he looks at the cards. GI picks up a handful of cards and tries to throw them onto the table and looks at his friends angrily: *' 'if you don't allow me to take part you will suffer'*. HK tries to calm him; HN also joins in and says that they will tell the teacher. GI turns from side to side moving the cards, trying to put them in order, HK stretches out and covers the cards and says: *'now we'll work together'*. GI sits down quietly. HN and GI move the cards. HK looks at the sentence and says: *'incredible, you've succeeded!'* HK marks the verb in the sentence correctly and HK has also meanwhile put two more sentences in order by himself. HN points to the cards which have verbs. HK nods. HN takes the marker and marks the verb. GI puts the last sentence into order and gives the marker to HN to mark the verb. Now all the sentences are set out and HK calls the teacher to check them.

24.12.2004

The Task: Each verb has to be shaded with a particular colour that corresponds to a particular construct on a jumbled sketch, if the verbs are correctly coloured they reveal a picture that was previously hidden under the jumbled sketch (see Figure C above).

<u>The Observation</u>

HN holds out the cards to HK and asks him to read what needs to be done. HK asks: *'why does it have to be me?'* HN shrugs his shoulders, looks at HK and angrily says: *'no!'* HK says that he knows what they are thinking. He takes the cards and reads the task instructions out loud.

GI takes a colour and wants to begin to do the colouring. HK takes another colour and begins to colour. He asks them to colour in weakly so that it will be possible to erase it. Each of them colours in a different colour. HK colours a lot

of pieces while HN only succeeds in colouring three of them. HK immediately discovers what the hidden picture is. GI pulls the picture to him and looks at it, noting that monsters can be seen. HN says that he hasn't finished colouring and asks his friends in the group to help him. HK tells him that he has to reveal the picture by himself. HN says that there are pieces that still need to be coloured. HK looks to the sides, he looks at HN and at GI, and he bends over to HN and nods. HN smiles: *'I thought so but to be sure I wanted your advice, shall we tell all the pupils?' 'Tell them what?'* asks HK *'that I always need to help you?' 'Definitely not! Do it already!'* They complete the colouring and the cards now display two dancing monsters.

Group B:
Observed on 29.10.2004 and observed again on 03.12.2004.

Name of pupil	Learning style	Sex
FD	K	Boy
FC	VARK	Boy
FE	A	Boy

29.10.04

The Task: The Kinaesthetic Task: identification of constructs according to their format– drawing lines from the verb to the appropriate format and to the appropriate construct. This is individual work (see Figure G above).

<u>The Observation</u>

FC takes the work-page and holds it out to FE, asking him to read it and to explain everything. FE asks FC not to shout and tells him that he will read out it out loud: *'don't ask I'll also explain, but try to listen and not to ask a lot'*. FD drums irritably on the table, rocking on his chair, irrationally throwing the pencils and the erasers and trying not to meet the eyes of the other members of the group. FE finishes reading and circles the first verb with his pencil. He begins to draw a line from the verb to the appropriate format. FE asks FD whether there is nothing he likes to do and says that at least FD *'doesn't have any*

mistakes: Let's see what you can do!' FD looks at him quietly. FE says:*' You know that I don't like to read'*. FD says angrily: *'FE do me a favour and read the verb to him, let's see if he knows how to mark the formats and the construct correctly'. 'O.K. but he'd better stop getting angry about everything'*. FE reads and FD gets up, he puts his hand out to the cards choosing a verb. He marks the correct format for the verb: *'So, what do you say? Was I right?'* FD closes his eyes. FC is silent. FE looks at the card: *'There's no mistake, everything is correct. Great let's continue'*. FC takes a pencil and tries to erase lines on the card. FC laughs: *'that's just a scribble'*. FC tries to crumple the card up like a ball: *'now we need to take a new card'*. FC straightens the card out explaining what the mistake was to FD. FD looks at the card and at FE. His eyes dart rapidly back and forth: *'I understand, now I can finish the other two verbs'*. FD draws lines from an additional verb to its construct format. He gives the pencil to FC: *'now it's your turn'*. FC draws lines and makes a mistake. FD jumps up from his place, he looks at him and shouts: *'what's that rubbish, its just ridiculous'*. FE corrects the mistakes. He passes the pencil to FD and asks him to try again: *'try not to make a mistake'*. FD tries and solves it correctly. Suddenly he forcefully pushes the chair away. He kicks the legs of the chair, throws the colours on the table, leaves the group and leaves the classroom. FC watches him go, astonished. FE signs him to keep quiet. They both continue and complete the task well. FE looks at FC and tells him: *'It's not terrible if you were wrong a bit, I corrected all your mistakes'.*

3.12.2004

The Subject of the Lesson: verbs in passive constructs

The Kinaesthetic Task: each group receives a hard sponge cube, a card circle stuck to a wooden toothpick. Each circle is perforated with four holes and a passive verb is written in the centre. Additionally there are pieces of cartridge paper with petals drawn on them, each petal is perforated and attached to a paper fastener.

The Task is to cut out the petals, to write on each of the petals one of the characteristics of the verb that fit the verb written at the centre of the white circle, and to join all the petals with the help of the paper fasteners to the centre of the the circle to create a beautiful flower. At the end of the process this

flower is attached to the toothpick with the blocks and stuck into the hard sponge cube (see Figure M above).

The Observation

FE looks at FD and asks him to read. *'What rubbish!'* says FD *'You always read the task'.* FE gives FD the cards: *'Go on'*. FD concedes and reads out loud.
FE asks FC to cut out the petals. FC says that he thinks that FD should also do the cutting out. FD says: *'You know that it comes out crooked when I do it'.* FE says that it's not terrible. FD begins the cutting out, pieces of cartridge paper fall on the floor. FC cuts slowly. FE takes a white circle and arranges the petals nicely around it. FE asks FD to stop humming and to take paper fasteners and do the joining. FE says that he will check *'that there are no mistakes'.* FD throws the scissors on the table and FC complains about the noise, saying that it confuses him. He tries to construct another flower and FE rushes towards him and tells him that he is mistaken; he replaces two of the petals and tells him that he can now join them together. FC is happy: *'good'* he says *'now I understand'*. FC connects the flower pieces with the paper fasteners. FE comes closer to FD and FD takes a white circle and looks at what is happening in the other groups. FE gives him the appropriate petals for the flower that he is holding in his hand. FE connects the petals to the flower with the paper fasteners. FC gives him the fasteners and FD puts his head on the table and is quiet. FC stands up; FD turns to him and asks him why he is standing. FC shows him the white circle and petals that he has chosen. FD looks at FE and calls to FE telling him that the petals fit the verb in the circle – FE says: *'I think that all the flowers are perfectly correct'* and FD sticks the flowers in the hard sponge.

Group C
Observed on 5.1.2004 and observed again on 7.1.2005.

Name of pupil	Learning style	Sex
GG	ARK	Boy
GF	VARK	Girl
GH	VK	Boy

5.11.2004
The Task: Pupils cut pieces of cardboard to create cards with slots appropriate for the form of a particular construct. The pupils then prepare a strip of paper with verbs that are appropriate for these constructs. Then they insert the paper strip behind the card so that the letters of the verb fit the slots on the card (see Figure D above).

The Observation

GG takes the card on which the task is written and asks the pupils if he can read them the instructions. The others do not answer, GH stands beside GG and says: *'why is it only you who decides, perhaps someone else wants to read, perhaps GF?'* She [GF] says: *'stop arguing, I don't care if GG reads'.* GH kicks the table gently with her foot and sits down. GF also sits down. GG picks up the card and reads slowly stopping from time to time to look at GF and GH: *'It seems clear to me, let's start'*. GH takes out the pieces of cardboard and sketches the different formats for the verb. GF stands beside him and looks at how he draws. She spreads out the slotted formats that he has already built. GH brings them together again and tells GF to begin to prepare the paper strips with the suitable verbs and GG gazes sternly at him and tells him that he is not the boss and that it's best for them to prepare the strips together.
GF asks GH if he can help them, the other two raise their heads and say *'Come on let's prepare the paper strips'*.
GH and GG prepared the strips writing the characteristics of the verb, passing them on to GF and she marks the letters of the root with a colour: *'I think that we've completed the task'*. She turns around and quickly presents GG and GH

with the heap of prepared strips. Everyone sits down. GH stands on one leg, reaching closer to the pile of strips and checks them one by one. GF puts her hand on his shoulder and he looks at her quietly, she bites her lip and asks if he has found any mistakes. GH takes an eraser from his pencil case and tells her: *'not anything serious, just one mistake'*. GG looks at the products; GF and GH stand around him and ask whether there are any mistakes. They check and in the end are pleased with their task.

7.1.2005

The Task: Sorting cards on which verbs and nouns are written. The pupils have to identify verbs according to the criteria that they have learnt. The cards with the verbs on are placed in the blue box on the right and the nouns in the red box on the right. The work is collaborative. The second stage necessitates placing the verb cards on a surface and placing thin strips of cartridge paper between the verbs that belong to identical constructs. Building the slotted cards for construct identification at the top of the cards and sticking the verbs from that construct there (see Figures E and F above).

<u>The Observation</u>

GG takes the task instruction page and reads it out loud. He takes several cards and puts some of them into the correct boxes. He passes the rest of the cards to GH, GH scribbles on a piece of paper and raises his head, GG stands up next to him and pushes the pile of cards towards him asking him to help: *'all of these are not verbs, put them in the box on the right'*. GH tells him that he does not like to read*: 'are you sure that you read them and checked there are no verbs here?'* GF looks at the cards and says that she is not sure; she turns to GG and asks him to check if all is correct. GG looks and says: *'why should I do the work for you, I don't have the patience'*. GF nevertheless pushes the cards towards him and asks him to help a bit. GG agrees and transfers some of the cards to the blue container. He raises his head and says: *'Now it's O.K'*. He again reads the instructions: *'I've got no desire to do it all by myself'.* He takes out the cards with the verbs, gives GF strips of cartridge paper and tells her to connect the verbs in the same construct. GF doesn't listen and plays with her pencils. GH writes down the verbs that belong to the same construct.

He hands the page to GF and tells her that this will help her to position the strips of cartridge paper. GF thanks him. GG says: *'you didn't need to write it, it can be solved without writing, we just need to understand'*.
GF screws up the page and throws it to the end of the table. GH straightens the page and tells GF that it will help her: *'this way we can finish the task quickly. I've already prepared the boxes and we have to paste on the verbs'*. GF works fast, the lesson ends and everyone rushes out to the playground.

Group D

Observed on 12.11.2004 and observed again on 25.2.2005.

Name of pupil	Learning style	Sex
EY	VARK	Boy
HO	R	Boy
FZ	VARK	Girl

12.11.2004

The Subject of the Lesson: Identification of Verbs and Constructs
The Task: a number of squares are distributed on a worksheet, on each square is written a verb root. These verb roots must be matched with four rectangles on each of which appear one of the four different forms of the verb (time, person, construct and root). The rectangles are cut out of an exercise book. The pupils are asked to match and paste the correct rectangles on the sides of the appropriate square. Each pupil can work alone (see Figure L above).

Observation:

EY says: *'This job looks easy; I'll read out the task'*. HO agrees and passes the instruction page to EY. EY reads out loud. HO says: *'Cutting and pasting again! Who's got the strength for this'*. FZ takes the instructions page from EY, studies it for a moment and goes back to sink into her chair waving the instructions page: *'I'm willing to cut out the rectangles'*.
She cuts out the rectangles, looks at HO and says to him that she will explain to him what he should do with the cut-out rectangles. HO is annoyed: *'Ouf!*

What a lot of rectangles'. EY hands him the cut-out rectangles. HO waves a finger at EY and tells him to add the root and the construct to the rectangles.
EY takes four of the rectangles and places them around a square and writes a characteristic of the verb on each one. *'What do you think, is that O.K"*? FZ laughs: *'great! But you forgot to paste the rectangles'*. She takes glue from her pencil case and passes it to EY. EY pastes and the others watch him. EY asks them not to budge him. FZ and HO watch as EY pastes and FZ tells him to hurry. EY asks why only he is pasting, he says to HO: *'now its your turn, here's a few squares*' and passes the glue to HO, who pulls FZ's hand and says *'now you continue'* so that she can continue the pasting. FZ takes the rectangles and arranges them around a square and writes the data for each rectangle. EY looks at her work and suddenly begins to stammer: *'I think there is a mistake here, the verb doesn't belong to the construct 'Hitpael"*. HO checks and says that EY is right. FZ erases and HO writes the correct construct on the rectangle. FZ tries not to look at EY. Now HO opens the exercise book, he holds his head in his hands and reads the exercise book ignoring the activities of FZ and EY. FZ finishes cutting out the rectangles and EY writes the data and pastes. FZ sits down next to HO and tells him to stop looking at the exercise book, asking him to check the pages that they have prepared. HO closes the exercise book and looks at what is written and says there is no problem. FZ asks him to hurry up because she sees that the other groups have already finished. HO praises the members of the group and says that they do not have any mistakes, and they take it all to the teacher to check.

25.2.2005

The Task: Preparing films – drawings are prepared to illustrate particular uses of a word. The pupils need to distinguish words that serve in one sentence as the subject and in another as part of the predicate. For example: 'The pupils ***run*** after the ball' and 'The muscular ***run***ners sat down to rest' and to draw suitable pictures to illustrate these uses for the film (see Figure H above).

The Observation

EY tells FZ that she will have to help him compose the sentences but says that he has no idea how to draw. FZ asks HO: *'what about you? Are you trying to get out of working?'* HO is silent. FZ laughs*: 'what have you got in your hand? Show me'*. HO holds out the page in his hand*: 'That's enough, I can't believe it, and I already composed two sentences'*. *'So why are you silent?'* FZ draws with the colours that HO has thrown to her, she says to HO: *'are you making fun of me, what have you given me, are these good colours?'* HO goes up to her and says that he thought she needed the colours to paint with, she asks him for Panda colours. HO is angry with them because they have not begun to draw although he has already prepared the sentences, she [FZ] begins to draw. HO looks at the drawing and also at the sentences that EY has written and says: *'what sentences should be pasted next to these two drawings?* EY shows him, and looks at HO and asks him if he doesn't know anything or he's just pretending he doesn't. FZ indicates to HO that he should keep quiet. EY takes two extra pages and writes sentences on them too. HO joins him. They all three continue to work, and FZ points to a new drawing. HO points to an appropriate sentence and he says that he understands that FZ has organised the sentences into a long film.

Group E

Observed on 19.11.2004 and observed again on 11.03.2005.

Name of pupil	Learning style	Sex
FB	VARK	Boy
HM	R	Girl
HL	R	Girl
JQ	VARK	Girl

19.11.2004

Kinaesthetic Task: Construction of a chain of paper strips. On one strip of paper the pupils write: the verb root, time, person and construct and they have to join the strip of paper to an additional strip of paper on which the infinitive form of the appropriate verb appears, for example, the verb 'dress': time = present; person = they; construct = 'hitpael' [intransitive and reflexive verbs]. They have to fix this strip to a strip on which the infinitive form of the verb: 'to dress' appears. Together the two strips form the chain of the particular verb. Each of the pupils picks a strip and tries to match it to another strip. In the end the group's cooperative work joins all the pairs of chains into one long chain (see Figure I above).

Observation

FB takes the strips of paper and throws them on the table in a heap. He looks at them and sometimes picks up a strip and looks at it fascinated. The girls sit completely calmly. FB takes a handful of paper strips and presents them to JQ. JQ moves impatiently and she blushes. FB turns to JQ and asks her if she really doesn't understand what is going on: *'check the paper strips and join two strips into a paper chain, if they fit'*. JQ says that she understands, HL looks at JQ's chain and is amazed that she has constructed her chain so quickly. HL seems confused: *'where did you put the other strips'* FB shows her the empty strips and tells her that she should prepare the pairs and HM will join those which are appropriate into a chain. HL takes a handful of strips and writes on them. FB asks: *'what should I do?'* HM hands him a pile of strips and tells him to match them with the data. HL shouts to HM that she can write the verbs and the data by herself and she doesn't need to write the verbs for her. Without looking at the work she goes back to the teacher's table and takes more empty strips of paper and she asks FB if he wants to work together with her. FB says that: *'we don't have to but it's not fair to leave you alone. So what do you think?'* FB says: *'we'll write the verb and then we'll fit it to the data or vice-versa'*. JQ comes closer and tells them that they should first write the verb. HM tells them that they should join all the strips together. HM comes nearer to HL, they work quietly together. JQ looks to see what they are writing. FB puts the chain on the table and calls out loud what is written on the chains and checks them. HM gives him the chain that she has prepared and he [FB] reads out

loud what she has written on them, she asks him to attach her chain to his chain, if there are no mistakes in it. HM asks him [FB]: *'why are you taking so much time'*, asking if it is because she has a mistake in her chain. FB shakes his head and says that he needs to link the chains and there are no mistakes. JQ links up the chain that she has prepared. HM collects the chain and goes to show the work to the teacher. The other pupils remain in their places.

11.03.2005

The Subject of the Lesson: The same word fulfils different roles; it may be either a subject or a predicate.

The Kinaesthetic Task: Pairs of sentences appear on cards. On each of the pair of cards the same word appears, on one card in the role of the subject and on the other card in the role of the predicate. The pupils have to colour the subject in blue and the predicate in red (see Figure J above).

The Observation

FB reads the card out loud, HM takes the card from him and says that it is now her turn to read the cards out to the group. FB takes the card back and is annoyed that she is not allowing him to read. HM gives him the card and FB reads out the instructions. Each one takes a card, marking the subject and the object and they work quietly. JQ takes out an exercise book and writes in it what is written on the cards that she has solved. HL asks her why she is copying the sentences. JQ continues to copy and says that she will check them at home, and she might have to alter some of the markings. HM laughs: *'if you've got a problem the whole group can check it for you'*. FB doesn't participate in this conversation. JQ shakes her head saying that she prefers to work with one other pupil and not with everyone. HL looks at JQ's cards, JQ reads the cards out loud showing HL what she has marked and HL confirms that all the markings are sound: *'you had no reason to worry, you don't have any mistakes*'.

Group F
Observed on 26.11.2004 and observed again on 18.3.2005.

Name of pupil	Learning style	Sex
JP	A	Girl
GJ	VARK	Girl
EX	K	Boy
FA	VARK	Boy

26.11.2004
The Kinaesthetic Task: Construction of slotted pages marked as appropriate for the different constructs either on a sheet of cardboard in which windows are cut or from a series of matchboxes. The different verb roots appear on small cards
The cards with the different verb roots are then slotted into appropriate construct on the slotted page and the pupils discover that in a different construct the verb has a different meaning (see Figure K above).
Preparation of groups of drawings for each root, each one showing a different meaning of the verb.
Observations
EX's eyes have closed; a wrinkle appears on his forehead: *'it's more fun to work together, who agrees?'* No-one answers. FA takes some matchboxes, GJ hands him one of the matchboxes. FA takes the box and says: *'this box is no good, bring another box'*. GJ gives him another box. FA turns his back to her and bends his head down over EX telling him to prepare the containers. EX performs the work, but slowly, GJ takes the paper strips from EX and helps him to write the roots. He lowers his eyes. FA looks at JP and asks why she has not written the different verb forms: *'you should have different verb forms with different meanings'*. JP looks at him and does not understand: *'I can't understand what you are saying'*. She gets up angrily and turns her back to the group. GJ talks to her: *'Here you are, here the verb is 'being dressed' and here the verb is 'dress'. You know how to draw the appropriate drawing nicely for each verb and I shall prepare the roots in the correct slotted format and I'll write the verb forms that emerge'*. EX is still busy with the matchboxes. His container is still not ready. He tells FA that he has a problem: *'I'd like to make*

the container but it's taking me a long time'. FA tells him that he is actually making an accurate format. EX: *'I understand how to make the strips but I'm not sure I'll manage to do it in time'.*JP draws and does not look at the other members of the group. GJ writes suitable sentences under JP's drawings. JP takes a new page and says that she doesn't remember which verb she is meant to illustrate. FA looks at her paper strips and tells her that she has missed the verb 'to feed', JP pushes his hand aside and tells him that she wasn't talking to him at all, EX looks at him [FA] and says: *'don't take any notice of her, ignore it she always acts like that'*. EX threads together the strips, he gives them to JP and she continues to draw.

18.03.2005

The Task: Each pupil in turn performs a one-minute pantomime, each of the members of the group writes down information that appears in the pantomime on a card and punctuates their writing. They exchange cards between them and each one criticises the card of the pupil to their right.

The Observation

The group sits down. FA takes the instructions page and reads the task to be performed out loud. JP puts her hands on the table and yawns: *'I never succeed in pantomime; I really don't fancy taking part today'*. GJ tells her: *'Actually it's easy, we'll do it together'*. EX shakes his head: *'it's not fair, that way we'll only have a few sentences, you can give her an idea but not together, each one has to do it by themselves'. 'You don't understand that I've got no desire to do a pantomime, I hate it when I'm forced to do something that I don't like. It's easier for me to draw'.* FA tells them to start, he will be the first and JP will be last: *'perhaps she will think of an idea – do you agree?'* JP nods: *'O.K'.*FA gets up and performs a pantomime, everyone laughs. GJ takes a page: *'I've got an idea for a sentence'*. She writes and picks up the page and reads out loud – everyone agrees. *'Do you think that EX should punctuate it and afterwards we'll check?'* FA is not happy about that: *'why should we wait for no reason until EX writes it, each of us can write a sentence by themself'.* They continue like this [each one working alone] until the end of the lesson.

Observations Findings for Class F

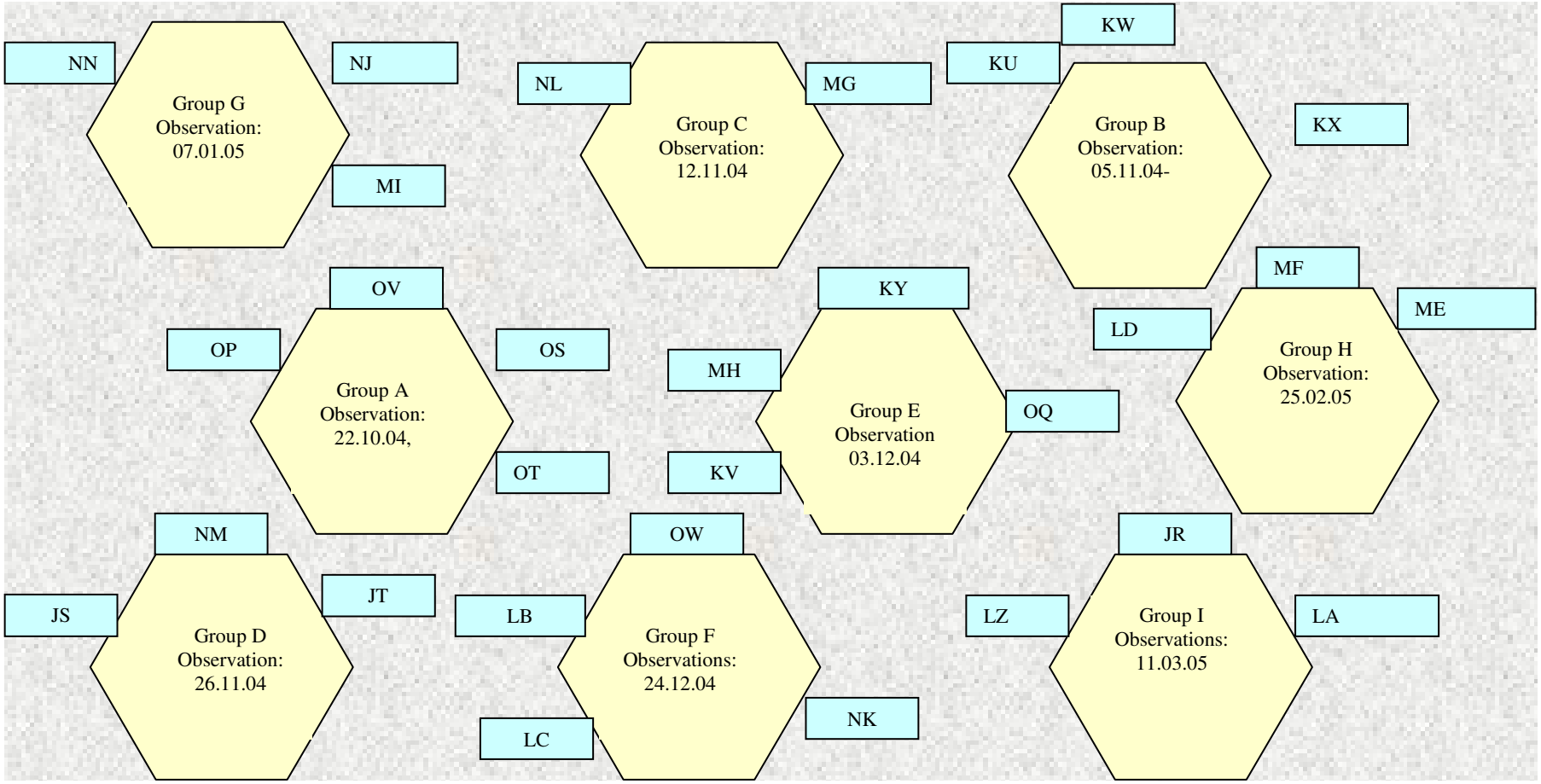
Description of the Classroom

As can be seen in Figure 7.4 below, in total there were 29 pupils. They sat in nine permanent groups. Each week a different group was observed.

Observations of Kinaesthetic work (last 15 minutes of each lesson). The tasks were varied. In the main the task implemented the knowledge learnt in the lesson, and the pupils could either work collaboratively together or alone as they wished. The pupils were used to working with the exercise book.

In this part of the lesson the researcher observed the work of the pupils and wanted to see what happened to the pupils, and how they accepted the Kinaesthetic work, in line with their own personal learning styles. Since the Kinaesthetic work is individually performed in the exercise book it was not possible to observe each and every one of the pupils in the class, so acting as a passive observer, the researcher focused each lesson on a different group of pupils. The pupils know the researcher well so that her presence was not threatening and the fact that she sat in on the lesson and wrote did not disturb their work.

Figure 7.4: The Classroom of Class F showing Seating Positions of the Groups Observed



Group A

Observed on 22.10.2004

Name of pupil	Learning style	Sex
OS	VARK	Girl
OP	VARK	Girl
OV	R	Boy
OT	VARK	Girl

22.10.2004

The Kinaesthetic Task: Construct Formats

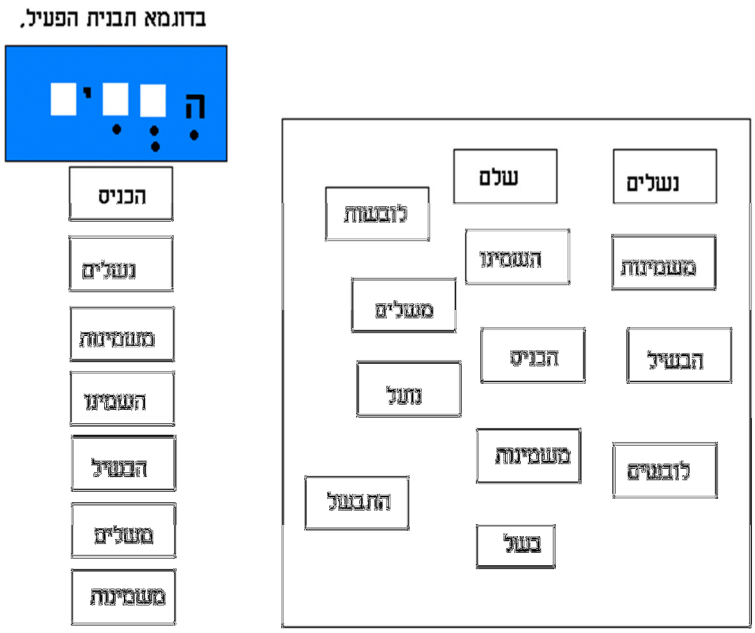
The activity in the exercise book included cutting, pasting, matching and completing units. There is a collection of different verbs in the exercise book; at least one verb is in conjugated for third person singular past tense (in order to enable the pupils to identify the exact format of the construct) for example the verb form 'put in' (third person singular past tense) which belongs to the construct 'hipal'. When the pupils identify the correct construct they sketch the format (slotted card) that is suitable for the construct and below the format they paste the cut out verb forms that belong to that construct. They learn to take a verb and to think what form it would take if asked about it 'in the third person singular yesterday'. For example the verb form 'they get fatter' if asked to put this into third person singular past tense it would be ' he got fatter' since they could more easily identify the construct in this form.

They were asked to circle the appropriate verbs for a particular construct – to create the appropriate construct format – in this case the format for the construct 'hipal' and to paste all the verbs that belong to that construct (in whatever tense and person)– 'get fatter', 'put in' 'will light up' 'they polish' under the format (see Figure P below)

Figure P:

Construct Format (Slotted Card) and verbs which belong to that construct

Cards showing verbs in various tenses and persons



The Observation

OT searches in her pencil case, looking for scissors, ' I don't fancy beginning to cut out and paste, it's a bit boring, why bother, I already understood the material. OP gives OT her scissors: *'Come on, let's work together. If it's easy it's actually fun to do'.* OT takes the scissors, working well; she cuts and matches, quickly completing the task. OP is very quiet. She cuts and pastes and doesn't talk to OT. OV sketches the appropriate formats in the exercise book, looks at OS's exercise book and erases OS's mistake. OS asks how something should be completed. OV sketches the appropriate slotted format in OS's exercise book. Both of them smile. OV continues to work quietly in his exercise book. OS again cuts and pastes and sketches the correct format. She looks again at OV's exercise book. OV uses his pencil case to construct a wall so that he can hide his work from the other members of the group. He hums quietly and is very busy constructing a three-dimensional format. He cuts and pastes, preparing formats and matching them with the cards that he has cut for the formats.

The bell rings for the end of the lesson. OV: 'Ouf it was fun to work and build things in those tasks and it's a pity the lesson has ended!'

Group B

Observed on 5.11.2004

Name of pupil	Learning style	Sex
KW	VARK	Boy
KX	VARK	Boy
KU	A	Boy

5.11.2004

The Subject of the Lesson: Matching verbs with a slotted format

The Kinaesthetic task: Constructing a slotted format from pieces of cardboard and a 'strip' with appropriate verbs (see Figure D above).

KU rests his head on the table, playing with his pencil, KW and KX read the task instructions. KX pulls KU by his shirt sleeve and indicates that he should begin to read the instructions, KU speaks out loud with KX. The teacher approaches the group and asks KU why he hasn't started to work. KU: *'I'm bored, I hate these jobs'*. KX offers to work with him: *'I'll cut and you paste. It's important, it will help you to know the subject matter for the exam'*.

Meanwhile KW has sketched quietly on the cardboard. He cuts it and presents KX with the scissors and organizes the paste and markers in the corner of the table. KW works assiduously, and doesn't talk with the pupils around him; he smiles to himself and looks at the slotted cards he has prepared.

KU stops working again. He draws something on a small piece of paper. KX reads him the instructions out loud and gives him cut-out pieces of cardboard. KU takes the cellotape and begins to work. He marks the verbs. After each small activity he shows KX and asks him how to continue. Now they are all working quietly; each one by themselves. KW's formatted cards are ready; he goes over to KU and helps him complete the task. KU says: *'I've got a problem. The work in the exercise book bores me, it's good that my friends in the group helped me; it's*

very difficult for me by myself. This is the only way that I could succeed in completing the task'.

Group C

Observed on 12.11.2004

Name of pupil	Learning style	Sex
MG	K	Boy
NL	VAR	Girl

12.11.2004

The Subject of the Lesson: Verb root and construction of tables

The Kinaesthetic Task: Building a table and also cards and matching the cards to the table. The exercise book contains a blank draft of a table and many rectangles on which data (verb components) appears and blank rectangles which the pupils fill in by themselves with verbs in different conjugations. They then cut out all the rectangles (the prepared ones and those they fill in) and paste them on the table in the correct positions (see Figure R below).

Figure R

Table Construct

Construct Person Time Root Format Verb

Construct

Cards with verb components

The Observation

MG was excited by the task: *'I love these tasks. I build the table and the cards by myself and then match the cards; I love to create special cards, when I do these things I learn better. Its more difficult for me to listen to the teacher, this way I understand better when I am doing work with my hands like preparing the cards to match the table'*.

NL works very slowly, Sometimes she gets annoyed, putting everything on the table, crossing her arms and mumbling: *'I can't succeed, it comes out crooked, I understand the subject matter but its difficult for me to build it and to do these tasks. I'm a bit annoyed. I can't succeed with anything. I've got no desire to do these tasks. I can't do them so well and I don't know why'.* MG completes the task and walks through the tables showing pupils what he has done.

Group D

Observed on 26.11.2004

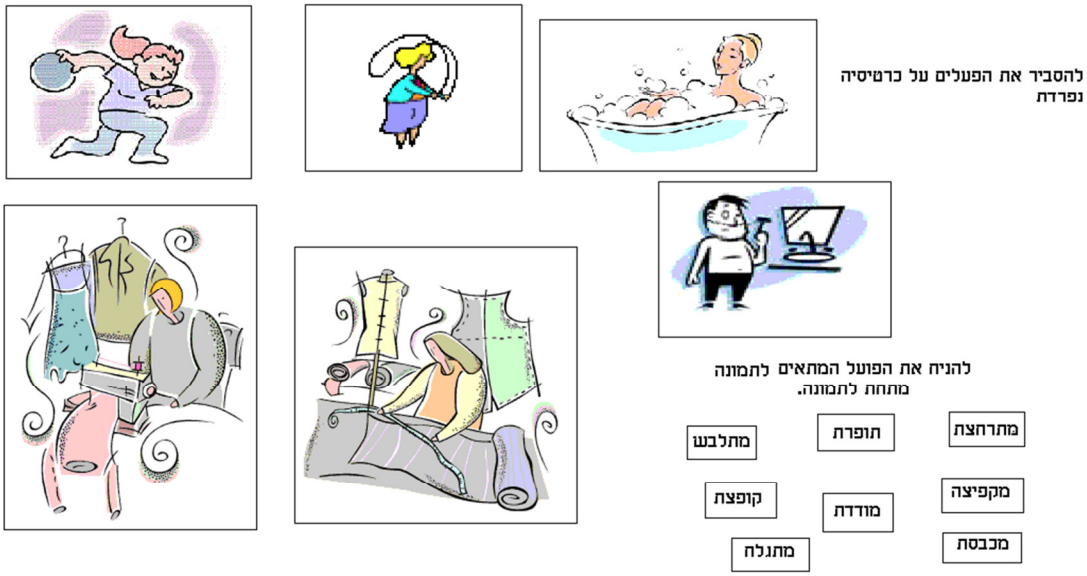
Name of pupil	Learning style	Sex
NM	VARK	Girl
JT	R	Boy
JS	R	Boy

26.11.2004

The Subject of the Lesson: Meaning of the verb – a task in which verbs are matched to prepared drawings, and preparation of cards on which the verbs are written in the correct form to match their meanings in the drawings. For example: a girl bounces the ball, a girl bounces up and down. The appropriate verb must be found from a list and then an explanation of the use of the verb is written on the card. In the above example 'bounces' is used either **passively** – 'a girl bounces the ball' the ball is bounced but the girl does not move or **actively** – 'a girl bounces up and down' the girl herself moves. (See Figure S below).

Figure S

The Pictures



Verbs to match to pictures

<u>The Observation</u>

NM tries to match the drawings to the verbs and gets very confused: *'I can't succeed in doing anything, perhaps a little, its difficult for me to match them, because the verbs seem to be the similar. I don't know the exact meaning of each verb, it's not so clear to me, but I think I'll succeed'*. JT shows NM how she has matched the verbs. NM corrects her mistakes. JS works quietly; he shows his work to JT, JT nods to signify that it is correct. The three of them now work very quietly. They are concentrating strongly on the task. NM asks JT if she can ask for his help again, JT: *'What don't you understand?'* NM shows him the three verb forms (they have an identical root but different meanings). JT: *'I'll help you!* 'JS tells her that she can also get help from him. NM*'I confuse the verbs, tell me what is the meaning of each of these verb forms, and then I won't get confused and I'll succeed in matching them to the pictures'*.

JS explains things to NMNM works and matches them to the pictures. JS smiles and tells her: 'well done!' They all work quietly.

Group E

Observed on 3.12.2004

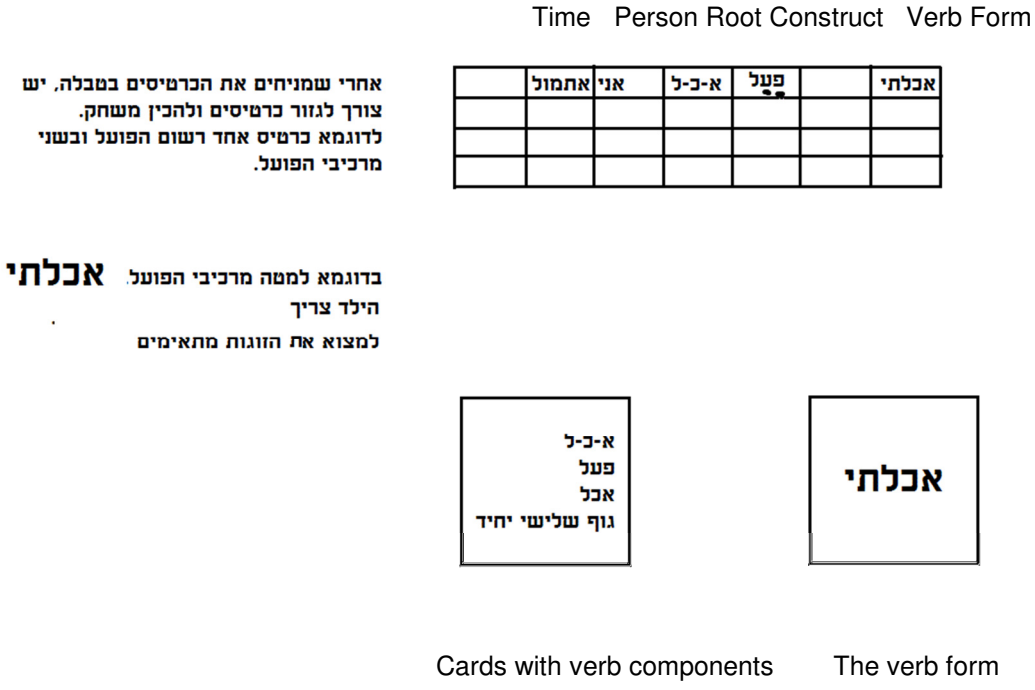
Name of pupil	Learning style	Sex
OQ.	VARK	Girl
KY	VARK	Boy
KV	VARK	Girl
MH	VARK	Girl

3.12.2004

The Subject of the Lesson: Verb table

The Kinaesthetic task: The pupils must create a game in which the root, time, person and construct of the verbs need to correctly matched, as in a game of Lotto or Memorisation Game (see Figure T below).

Figure T



<u>The Observation</u>

KY asks KV to cut the cardboard into equal squares. KV suggests cutting round shapes, so that it will be possible to spin them. KY says that squares are better:

'in the middle we'll write the verb and on the sides we'll put the verb components. Do you think that a circle is better?'

MH: *'No I also think a square is good'*. OQ says: *'I've no idea, who will prepare the game board?* MH answers: *'Let's prepare it together, we need a large piece of cardboard, perhaps we'll use this cardboard? We have to cut the edges'*. KY: *'that's a good idea let's divide the work. Who wants to write the verbs on the cards?'* MH takes the cards and writes the verbs. She passes each card that she completes to OQ who writes the verb components. KY checks the cards and corrects mistakes, KV colours each component in a different colour. All the time she shows KY what she has done. KY tells her that it is OK.

Group F

Observed on 24.12.2004

Name of pupil	Learning style	Sex
OW	VARK	Girl
LC	VRK	Boy
LB	VARK	Girl
NK	AK	Girl

24.12.2004

Kinaesthetic Task: Identification of verbs according to different constructs. If the shapes containing verbs belonging to a particular construct are correctly coloured in the same colour, and other shapes containing verbs belonging to another construct are correctly coloured in a different colour – a picture is revealed (see Figure C above).

<u>The Observation</u>

Each one plays by himself, involved in their individual work. LC shows everyone when he succeeds in revealing the picture. LC asks NK if she needs help, NK refuses his offer and corrects her mistakes by herself so that she also reveals the picture. She smiles and shows it to LC. LB works quietly, each one is working

alone. They don't pay attention to the other pupils. OW asks NK for the colours. NK gives her a colour and looks to see what she has done, OW hides her work with her hands, and she tries to continue to work quietly by herself.

Group G

Observed on 7.01.2005

Name of pupil	Learning style	Sex
NN	K	Boy
NJ	K	Girl
MI	K	Girl

7.01.2005

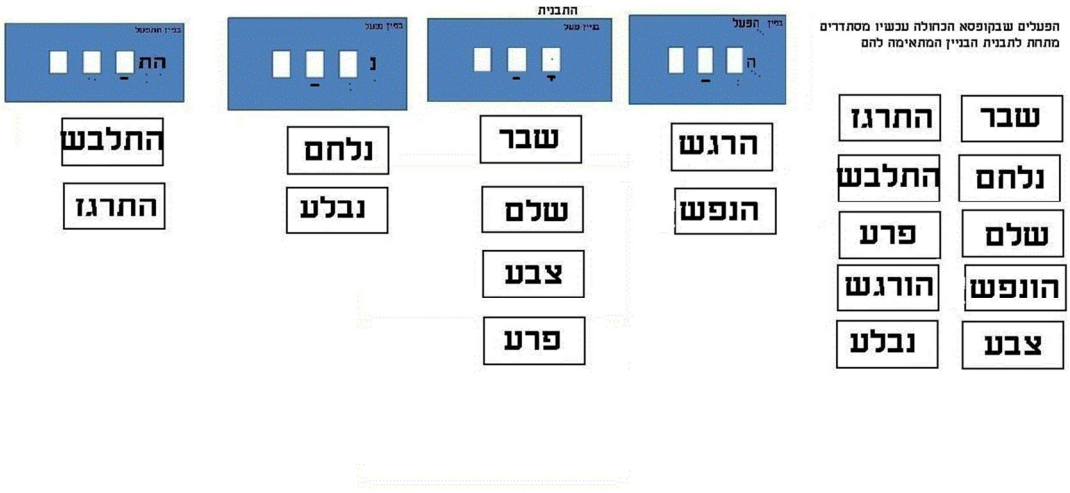
The Subject of the Lesson: Identification of constructs.

The Kinaesthetic Task: The teacher hands out pages describing the task – drawing lines between identical constructs. The pupils construct a slotted card to identify the construct. They cut out and paste verbs according to their construct. They have three objectives (see Figure V below):

1. A page with many verbs written on it, lines to be drawn between all the verbs that belong to the same construct.
2. To create slotted cards for the constructs that were identified.
3. To create a table and to cut and past the verbs in the correct position according to the construct to which they belong. (See Figure V below)

Figure V

Slotted cards for construct format – verbs arranged below verb cards before identification



The Observation

Each pupil takes a page and begins to work alone. The pupils ignored each other. NN asks how the model should be prepared. NK is annoyed by him: *'You're interrupting my work; I don't want us both to make the same thing'*. NN asks for help from MI: *'you always know how to make things accurately, and you also know the subject matter well'*. MI explains how he should deal with the task.

NK says that it's not worthwhile working like this, and suggests using four different markers and to mark all the parts of the construct formats as the same size. MI says: *'it's unimportant; you could do it like this or like that. I suggest that each one does what he understands, both methods are good'*. NJ doesn't want to cooperate. She peeps at the work of the others and wants to catch up with them.

Group H

Observed on 25.02.2005

Name of pupil	Learning style	Sex
MF	RK	Girl
ME	K	Girl
LD	VR	Girl

25.02.2010

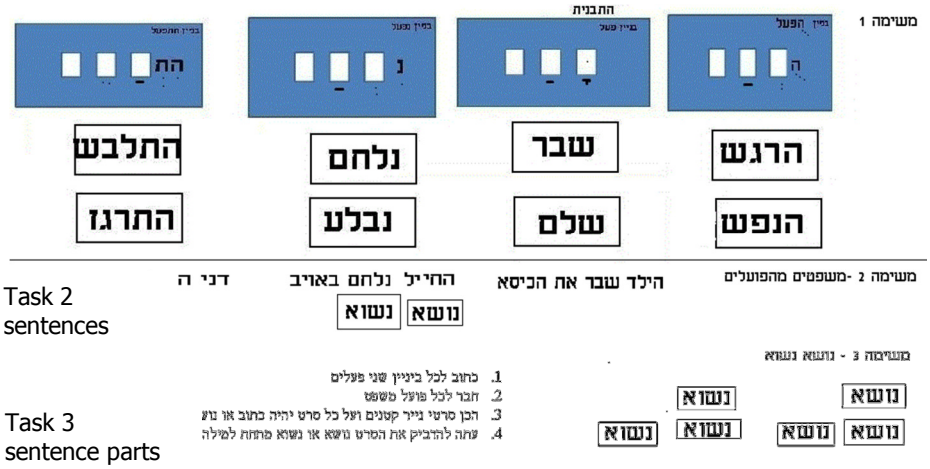
The Subject of the Lesson: Subject and Predicate – different roles of a word in a sentence

The Kinaesthetic Task: The task is composed of four activities (see Figure W below):

1. Writing two verbs that belong to each construct
2. Compose a sentence for each verb
3. Paste the strip with the subject or predicate under the appropriate word in the sentence.

Figure W

Task 1: Construct formats (slotted cards)



Verb cards arranged under construct formats

Task 2 sentences

Task 3 sentence parts

<u>The Observation</u>

Before the group began to work they spoke between themselves and decided to share the work. MF: *'I'll solve the first two tasks. And the last two'.* ME asked LD to hold the page and help her to plan the strips on which they would write the different sentence parts. LD stopped her work to help her until she completed her construction, MF asked whether LD needed help, LD said that she didn't. She works with concentration and completes the work quickly. ME collects the work of the three of them in one box and they complete their work before the time limit and began to chat. MF draws something on a page and shows it to LD who laughs and writes something beside the drawing. MF explains what she has done to ME and how and LD also explains to MF what she has done.

Group I

Observed on 11.03.2005

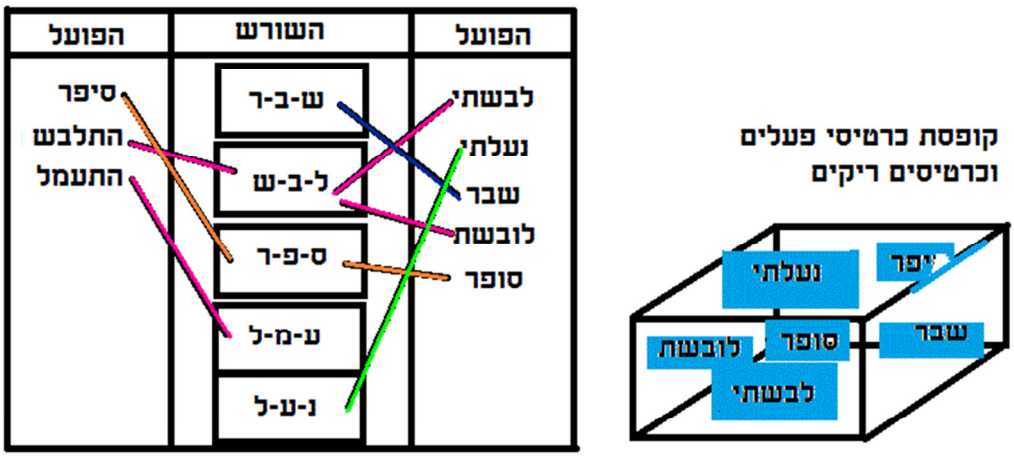
Name of pupil	Learning style	Sex
JR	RK	Boy
LA	V	Boy
LZ	RK	Boy

11.03.2005

The Kinaesthetic Task: Work with a sheet of cartridge paper and a box with cards on which verbs are written and blank cards. The cartridge paper must be divided into three columns. In the two external columns the verb cards are pasted and in the middle column the blank cards are pasted. On the blank cards the pupils have to write the roots that they identify for the verbs in the other columns and to draw a coloured line to join the verb to its root – each root having its own specified colour (see Figure X below).

Figure X:

Verbs Root Verbs Box with conjugated verb cards



The Observation

JR: *'I'll show you how this first task should be done'.* He takes the piece of cartridge paper and divides it into three columns, drawing lines from the roots to the verbs. LA and LZ look at him as he works. LA asks him why he draws the lines in two directions and JR explains that the same root can be used to build different conjugations of different verbs, and he continues to work and explain. The others watch him.

LA again asks a question: *'explain it to me because I want to understand the subject matter'.* Now JR and LZ begin to cut out and match the parts and all the time they look at LA who has not done anything and ask him: *'do you understand?'* When LA says that he does not understand they stop their work and explain to him how they are building their model, and why it is important to note the different colours.

JR divides the work up between them all and tells them what to do. LZ says: *'you should have let him [LA] choose, it's not fair to decide for him'.* When all the tasks are completed successfully, LA says: 'What fun!'

APPENDIX 7.2: ANALYSIS OF DATA FROM OBSERVATIONS OF THE KINAESTHETIC PART OF THE EXPERIMENTAL LESSONS

Table 7.2: Summary of Observations during Kinaesthetic Work in Class E1

Group And Pupil's Name	Pupil hinders	Acts outside the task framework	Group leader	Gives Real help	Verbally Encourages	Helped by teacher	Helped by pupil	Works alone	Boring task	Unnecess-ary Task	Technical difficulty	Cognitive difficulty
Group A 22.10.04		EW		AC	AC			AC	EW		AA	AC
				AA				AA				
								EW				
								DQ				
Group A 24.12.04 A					AA			EW			EW	AA
					AC			DQ				AC
					DQ							DQ
Group B 5.11.04	AE		AD	DT	DT			DT	BF		BF	BF
	BF		AE	AD	AD			AD				
			AE					AE				
								BF				

Group And Pupil's Name	Pupil hinders	Acts outside the task framework	Group leader	Gives Real help	Verbally Encourages	Helped by teacher	Helped by pupil	Works alone	Boring task	Unnecess-ary Task	Technical difficulty	Cognitive difficulty
Group B 07.01.05			AE	AE							BF	BF
			DT		AD	DT		AD				DT
			AD		AD			AE				
			AE					DT				
			DT					BF				
			AE									
			BF									
Group C 29.10.04				CL		EV	BH	EV			EV	BH
								CL				
								BG				
								BH				
Group C 25.02.05		BJ	EV	BG	CL			CL				EV
			CL									EV
			BG									
Group D 19.11.04		BI	DS	CK		DS		BH			BH	BI

Group And Pupil's Name	Pupil hinders	Acts outside the task framework	Group leader	Gives Real help	Verbally Encourages	Helped by teacher	Helped by pupil	Works alone	Boring task	Unnecess-ary Task	Technical difficulty	Cognitive difficulty
								BI				
								CK				
Group D 11.03.05	BI		DS	DS	BH		CK	BH				
			DS					DS				
			DS					CK				
								BI				BI
Group E												
26.11.04			DR	AB				AB				
								EU				
Group E 18.03.05			. DR	EU				CM				
			AB					AB				
			CM					EU				
								CM				
Group F 12.11.04		CN	CO	CO	CO			CO				CN
		CN		DP	DP			CN				DP
				CO				DP				
				CN								
				CO								

Group F 03.12.04			CO	CO	CO			CO				
			DP		DP			CN				
			CO		CO			DP				
								CN				

Summary of Observations of Group A

Ist Observation

The members of the group begin to work individually. AA encounters a technical difficulty (lack of suitable equipment - cutting is required and there are no scissors). This leads to an argument with another member of the group, AC (VARK), who offers real help, AA will agree to a cooperate with her. But when AA (K) is not ready to cooperate, AC (VARK) withdraws her offer of technical help, preferring to continue to work alone. She starts cutting by herself but then, encounters a cognitive difficulty. Now she is the one who needs help. She initially approaches a third member of the group, EW (VARK), expressing her anxiety because of the cognitive difficulty: *'I can't succeed in doing it! Everything's upside down! What a mess!'* but she hits a dead end because EW is unwilling to help her.

AA (K) reciprocates by offering the technical help that AC offered her at the beginning of the lesson, and without even talking; she helps her to overcome the difficulty. AC (VARK) has finally won the cooperation she wanted so much at the beginning of the lesson: *'Wonderful, we will work together'*. At this stage, when each of the two girls has received the needed help (technical help for AA for and cognitive help for AC) they have reached a state of reciprocal relations - each one has given the needed help to her class mate. They work in cooperation, helping each other without any superfluous chatter. Both these girls have a K element in their learning style. Learning through work is interesting, joyful and fascinating for them throughout the lesson.

Cognitive and technical difficulties prevent them from working at the beginning of the lesson, but after each one realises that they are not alone in their difficulties, they finally reach a state of reciprocal assistance which helps to solve the difficulties for both of them, so that they are able to work continuously until the end of the lesson.

With the third member of the group, EW (VARK), the situation is slightly different. She shows a lack of interest in the task. She does not cut anything although she has scissors. She writes down numbers (which shows her understanding of the task, but avoids performing the activity relevant to the task). When, after a significant delay, she finally starts to cut the cards, again, she shows a lack of

interest in performing the task - she does not compose sentences from the cards and even tries to make part of them disappear by shoving them under the table, despite the fact that she had already marked numbers beside the words, proving her understanding and the fact that she knows how to arrange the cards, but showing impatience regarding the Kinaesthetic activity. She does not only express this impatience through her activities, but also specifically, mumblings quietly to herself *'I don't jobs like these, I've got no patience for cutting and pasting … what's the time, when will they ring the bell?'*

The fourth group member DQ (VARK) works by herself from the start, she does not need any help and does not give help to others. She works alone.

Summary: there are no interruptions by any of the group members. All those with a K element in their learning style show an interest in their work. Even if some of them had difficulties at the beginning, they overcome them and perform the task continuously and with interest. The exception is EW (VARK), who shows that she is disinterested in the task and impatient and even avoids its completion. She avoids giving help to AC, although she completed understands the task and is able to perform it successfully.

2nd Observation

During the second session, the Kinaesthetic task could not be performed if the cognitive part was not clear. There are four girls in the group with a K element in their learning style: three of them really wanted to perform the Kinaesthetic task, but since they did not understand the cognitive base, they needed the assistance of EW (whose style is VARK). EW was the only one to understand the cognitive part, which constitutes a necessary preliminary step before being able to perform the Kinaesthetic task. She definitely had difficulties in performing the Kinaesthetic activity: *'Ouf! I really have to make efforts to make it come out correctly'* despite her K element. The girls did everything to encourage and prompt her to help them pass the preliminary step. *'Perhaps you'll try to explain it to us, DQ'*, since they wanted to reach the Kinaesthetic step. *'I just wasted my time, we know that you're the one who is really good at it'*. They were happy when she explained it to them and actually applaud her *'That's the way!'* They perform the Kinaesthetic step energetically and really get excited when the drawing of the monster is revealed.

At this final stage EW is also content with the results of the Kinaesthetic work and its course, despite her lack of enthusiasm at the beginning *'it is nice, this is the first time that I succeeded with thi*s'.

Summary: It is perhaps fair to say, that even EW (VARK), who was impatient with the Kinaesthetic task, managed to enjoy it in the end, working within the group, with the support and encouragement of the other girls especially, after she had helped them. From the observations of the results of EW's VARK questionnaire (see Section 3.7.2) it can be seen that the Reading/writing element R is dominant and not the K element, which may explain her behaviour during the observation.

Summary of Observations of Group B

This is a group of three boys and one girl. Two of the group members have a K element in their learning style and two do not have the K element, but the task before them is a Kinaesthetic task. AD and BF avoid starting to work. A long time passes until they look at the task. They look at the assignment sheets, but none of them begins to cut. They are considered as industrious and sometimes act as the group leaders. It seems as though they begin to work, not necessarily because they find the assignment interesting, but because they want to guide and lead the group. It becomes apparent when AD (R) is reading the assignment's instructions out loud, and AE interrupts her. He does not need a leader to explain to him what is to be done. He refuses to be led. *'Enough! We've understood, let's start to cut!* BF (VAR) expresses the situation well: *'we all understand what needs to be done, and I don't like this work at all'.* It is neither a lack of understanding, nor disorganisation that prevents them from performing, but rather, a lack of motivation for such a Kinaesthetic assignment.

AE and BF act disruptively. Although they do not actively sabotage the work, they prevent it from its future progress as AE announces that he will not assist BF if needed*, 'Just don't ask for help as you always do',* and BF responds with an angry expression, replying, *'You are so annoying!'* When AE notices BF's mistake, he does not assist because he wants to help, but corrects him while offending him, *'You always do everything contrarily',* unlike DT (VAK), whose response to BF's mistake is completely different: *'you've got it wrong. Perhaps you'll look at mine*'.

AD tries assisting in a similar tone: *'If you want, you can try my method'.* When she notices BF is not working, she asks: *'Do you want us to help you?'*

The group faced three obstacles:

1. Lack of enthusiasm to perform a Kinaesthetic activity.
2. Leadership and control struggles within the group.
3. BF who failed to work without substantial help from his teammates.

They overcame these obstacles, worked diligently, and eventually managed to complete the assignment.

During the second session, they faced some difficulties with the Kinaesthetic work. They wasted much energy trying to decide how to arrange the work, how to begin. Yet upon making a decision as to the mode of accomplishment, they worked quietly, though individually, rather than as a group. AE (VRK) appointed himself as the leader, but BF did not understand the assignment, and demanded an explanation. AE responded to him. DT, also tried to take charge of the proceedings – *'I think its really worth reading the cards out loud first'.* AD defends her leadership, trying to calm him down by saying, *O.K., I'll read the cards out loud*'. After everyone's input to the group leadership, an atmosphere of activity prevailed. Everybody worked dynamically and enthusiastically, uttering cries of amazement. If a disagreement arose, they approached the teacher for assistance. They all completely agreed to accept the teacher's ruling and the leadership struggle immediately calmed down, commencing an intensive, yet quiet and calm period of individual activity. Due to disagreements, they lost time, leaving some of the assignments as homework.

Summary of Observations of Group C

The group includes two girls with a VARK learning style and a boy, whose learning style includes a K-element, and a girl whose learning style completely lacks that element.

BJ (VARK) wants to perform the Kinaesthetic assignment, but encounters a cognitive difficulty. She does not understand clearly what she should be doing, expressing lack of confidence in her ability to successfully accomplish the assignment. *'I have to succeed today. What can I do in order to be sure that I*

solve it correctly'? None of the girls assumes the leader's role. Those who understand work individually. Those who don't (BJ, VARK) peek into the work of those who do, who, when noticing her lack of confidence, rush to offer her practical assistance and support. CL smiles at BJ, sketching the form construction for her, assisting her with advice, *'Try to match the root with the slotted format, like this you see; if the verb is in that construct… I hope you get it*'. The assistance is practical and effective. The girls' work is intense and soon they complete the assignment. EV (VRK) barely copes with the Kinaesthetic activity. He pauses, trying to catch sight of what they have done. BG(R) has difficulty understanding why he cannot manage the assignment, hiding her own work from EV. *'It's high time that you finished your work by yourself*'. Although CL smiles at EV, she, too, refuses to assist him. *'Otherwise the teacher will make us explain to you over and over again*'. At some point, all group members work independently. They are quiet, concentrating, not talking to one another. However, their work mode is different, as EV only works after being encouraged by the teacher. The girls in the group were impatient with the boy who had difficulty with the Kinaesthetic activity, while BJ, who had a cognitive difficulty at first – not understanding and unsure of her comprehension of the task requirement - received an explanation from her friends, surmounted the cognitive difficulty, decisively and successfully accomplishing the task on her own; there was no leadership conflict, nor was there any interruption.

The work was not interrupted in the second session. In contrast to the previous session, cooperation among the group members created a pleasant atmosphere. CL: *'Its more fun if we all work together, that way we can help and also finish the task more quickly.'* There were also demonstrations of initiative in the group. EV: *'Perhaps first we'll compose all the sentences that could be suitable'.* CL: *Perhaps it's worth using a different colour to mark the subject and another colour to mark the object like they had in the presentation'.* They demonstrate their willingness to help.

BG makes a remark on CL's drawing: *'You didn't understand the instructions, we have to think about different sentences with the same word, sometimes it's the subject and sometimes it's the object*'. CL does not react angrily, but smiles and

suggests BG would try. EV still reports a cognitive difficulty, and lack of motivation for that assignment; *I'm tired, I can't manage so well to compose sentences like these. I feel that I'm not helping'.* This time, however, the girls don't leave him out of the group, but try to calm him and involve him in the work process. CL: *'Enough, stop your nonsense and begin to work'.* The consequence of change in the work process is apparent within the group'. BG (smiling): *'I love working together, in a group*'. Following the inquiries and the arguments, everybody works quietly and cooperatively, showing each other their work.

Summary, again it is apparent that a pupil, who lacks the K-element in his learning style, finds it difficult to perform the Kinaesthetic activities, and shows low motivation and a lack of confidence to perform that type of assignment, . Yet the practical or verbal assistance from the other pupils is very effective, eventually resulting in his being able to cope with the assignment and complete it.

Summary of the Observations of Group D

1st Observation

This group numbers four boys. The learning style of three boys includes a K-element; one boy's learning style is R. The successful completion of the Kinaesthetic assignment requires a cognitive understanding of meaning of the verb which is written on the paper strips. The group members work cooperatively, dividing the assignments between them. The actual, Kinaesthetic activity of chain construction is assigned to DS (K). BI (R) shows no interest in the assignment during the first stage of work, and is not cooperating. Even when he finally begins working, he expresses dissatisfaction and has difficulty accomplishing the assignment. *'I can't find the strip with the appropriate verb'*. BH (VARK) and CK (RK) manage to quickly work on the cognitive part which precedes the Kinaesthetic part, and to understand the text written on the strips and match them. They include DS, assigning him the performance of the Kinaesthetic part of the activity. DS cooperates willingly. During this activity, nobody assumes the leader's role. There is cooperation and work distribution, as the group members attempt to assign tasks to each member according to their strengths. The atmosphere is calm, the work is cooperative, and the group accomplishes the assignment.

2nd Observation

During the second session, BH (VARK) shows a slight lack of confidence in accomplishing the assignment; 'I *understand it. So far, I only had one mistake'*. He often looks at CK's (KR) and BI's (R) assignments, though the latter reports a cognitive difficulty – *I'm not sure that I'll manage to solve this alone*'. In fact, he looks for help, which comes from BH (VARK) who verbally encourages him – *'Don't worry. Every time you need help, I can help you'*. Despite that promise, BI does not engage in the Kinaesthetic activity, but rather, in activities which are not related to the task; he plays with his pencil and is, actually, disruptive. Though CK and DS are working together, DS tries to take over, criticising CK's work and assuming a controlling position. *'For now, I'll colour what you forgot below and you can continue to work on the upper part*'; ', BI inputs his comment, too. *'Why aren't you doing the second task*?' Yet when DS senses that BI meets a true difficulty, he lends him a hand: *'Wait, let me do it'*: Apparently the practical assistance strengthens and encourages him, and then, practically all group members work quietly, though BI is still not completely confident, and frequently compares his work with DS's cards.

DS does not relinquish his controlling position, and though BI settles down and accomplishes the assignment, he decides to check whether or not BI has successfully accomplished the Kinaesthetic assignment: *now I'll check to make sure you haven't made a mistake'*.

In this activity, DS (K) seems to feel rather confident about accomplishing the assignment, and assumes the leader's role. Since he is a positive leader, who practically assists and takes great interest in his peers' work progress, those group members who feel unconfident and experience difficulties, especially cognitive difficulties, feel reinforced, and eventually, cope successfully with the Kinaesthetic activity, which they perform well and accurately, working quietly and diligently, demonstrating perseverant resolve.

Summary of the Observations of Group E

1st Observation

The group members work individually. Each member constructs the model on his own. There is no group work, nor is there any cooperation or demonstrations of mutual assistance. AB (ARK) is the first to manage to construct a three-dimensional form. When DR (VR) compliments her and offers to work together with her, literally seeking her help and explanations of what to be done. AB evades her advances and tries to avoid fulfilling her request, asking DR: *'Why don't you try to prepare it by yourself'*? EU works independently, successfully and delightedly (smiling). He does not seek any help. *'I like doing work like this'.*

Throughout the activity, they work quietly and diligently, except for DR, who is constantly walking around them, comparing their works, even explaining, *'I think that AB's container is better. She wrote the letters clearly on the container*'. Despite all her attempts and remarks, she does not manage to lead the group members discuss the assignment together.

Two group members whose learning style includes the K-element are focused and work hard on the Kinaesthetic activity. They work diligently, not talking to the other group members. They are absorbed in their work. They report their satisfaction concerning their work, as well as a sense of fulfilment and accomplishment. DR is the only one who is trying to lead the members as a group, but they will not respond to her. She imitates their work, eventually stops talking. Eventually, all group members are working, still not interacting; each one to himself. (CM (VARK) is quite inactive in the group. Nobody interacts with him).

When assistance was not available, DR simply observed the others who were performing the task, attempting to complete her task as well, by attempting to copy from them. Meanwhile, the pupils whose learning style included the K element, became immediately absorbed in their work when they were assigned a Kinaesthetic activity, concentrating and enjoying their work.

2nd Observation

In the second session, group work is required to accomplish the task. The assignment seems very clear to everybody. Nobody feels in need of assistance.

The work is performed as team work. The leader's role alternately rotates from one to another, when somebody else suggests an idea regarding the mode of execution, and the group follows.

CM (VARK) is the only one to express his reservation concerning team work: *'I am not sure that's worthwhile. It's a waste of time*'. In his opinion, it is more effective for the group to have one leader who will decide what is to be done, and when. DR, whose learning style, also lacks a K-element agrees with him, but with reservation: *'on the one hand its more interesting if each one suggests a sentence, but on the other hand arguments will start and I don't have the strength for that'*. EU (VARK) immediately begins working on the assignment, while ignoring the argument. Eventually, DR (VR) says the final word in the argument by finally confirming the sentence written by EU, urging her fellow group members to stop arguing and begin working toward completion of the assignment. *'Go on, let's use it and that's that*'. When there is finally a person who takes the lead (DR, VR), everybody joins forces and works through to the successful accomplishment of the assignment.

Summary of Observations of Group F

Ist Observation

This group includes two girls, who demonstrate a K-learning style. Seemingly, there are no power conflicts within the group. They demonstrate a great extent of willingness to work (they are arranging the desk); they want to work. CN and DP face a cognitive difficulty. At first, they channel all their cognitive energy into matters which are unrelated to the assignment. CN (angry expression): *'That's enough. I'm fed up*', even after examining the rectangles with concentration. CO does not experience any cognitive difficulty, so she assumes the group leader's role. *'Hey, wait a minute. What's happened? Perhaps we can easily solve the problem, if we work together*'. As soon as CO explains and they are able to grasp the task, they work with concentration. CN has the equipment (scissors). At the beginning of the process, she refuses to share it with the others but upon receiving help she questions DP: *'Can I have the scissors at all?*', and then she shares the scissors. When they find it difficult to understand, they do not work, but engage in other matters. When the difficulty is resolved, each works individually.

2nd Observation

In the group's second session, CO begins her work and attempts to prompt DP to work. When DP is working, she notices that CN is not working, and trying to prompt her by saying: *'I think you are not performing adequately'.* CO attempts to prompt CN as well, yet she applies a conciliatory *Do you want to help me to cut out the petals or do you want to help DP?'* encouraging her by saying: *'Great!'*, and offers her options for activity. Meanwhile CN handles the technical aspect, sticking the toothpick in the hard sponge, she expresses lack of confidence, showing her work to CO: *'look did I match them up correctly?'* It was noticed in the previous group activity that CN faced a cognitive difficulty. It seems that CN is the weak link, when she is passive, those around her prompt her to work, and when she is active, and they support her by asking if she needs help. When she has finally accomplished something, they encourage her. Once the assignment is completed, the entire group seems to have a sense of pride.

Table 7.3 Summary of Observations during Kinaesthetic Work in Class E2

Group And Pupil's Name	Pupil hinders	Acts outside the task framework	Group leader	Gives Real help	Verbally Encourages	Helped by teacher	Helped by pupil	Works alone	Boring task	Unnecess-ary Task	Technical difficulty	Cognitive difficulty
Group A 22.10.04	GI		HK	HK	HK		HN	HN		GI	HN	GI
			HK	HK	HK			GI				
			HK	HK				HK				
			HK	HK				HN				
Group A 24.12.04			HK	HK				GI				
					HK			HK				HN
					HK			FE				
Group B 29.10.04	FD		FE	FE to FD	FE by FC		FE by FC	FD			FC	FD
	FD		FE					FC				
	FD			FC to FD				FD				
	FD	FD	FE				FD by FE	FC				
								FC				
								FE				
Group B 03.12.04	FD		FE	FE	FE		FD BY FE	FD			FD	
				FE	FE		FD BY FE	FC				
				FE	FE			FE				
					FE			FC				
								FD				

Group And Pupil's Name	Pupil hinders	Acts outside the task framework	Group leader	Gives Real help	Verbally Encourages	Helped by teacher	Helped by pupil	Works alone	Boring task	Unnecess-ary Task	Technical difficulty	Cognitive difficulty
Group C 05.11.04	GH		GG				GF BY GH	GH				
	GF		GG	GH	GF		GF BY GH	GH				
	GG			GG	GG			GG				
								GF				
Group C 07.01.05	GF	GH	GG				GH BY GG		GH			
		GF			GH		GG BY GF	GG				
					GG		GF by GG	GH				
							GF BY GH	GF				
Group D 12.11.04			EY		FZ						HO	
		HO	EY	FZ TO HO	FZ		HO BY EY	EY	HO		HO	
			HO	FZ	FZ		HO BY EY	FZ			HO	
			EY	EY	FZ		FZ by HO	FZ				
			HO					HO				
			FZ					EY				
			FZ					HO				

Group And Pupil's Name	Pupil hinders	Acts outside the task framework	Group leader	Gives Real help	Verbally Encourages	Helped by teacher	Helped by pupil	Works alone	Boring task	Unnecess-ary Task	Technical difficulty	Cognitive difficulty
Group D 25.02.05			EY		FZ			HO				
			FZ	EY			FZ by EY	FZ				
			FZ					EY				
			EY					FZ				
			EY					EY				
			FZ					FZ				
								HO				
								FZ				
Group E 19.11.04			FB	FB	JQ BY HL		JQ BY FB	JQ				
							HL BY FB	HM				
				HM to FB								
				JQ to FB and to HL								
Group E 11.03.05			FB	HM to JQ	HL to JQ			FB				
			HM	HL to JQ				HM				
								HL				
								JQ				
								FB				

Group F 26.11.04			GJ		GJ			EX			EX	
				GJ to FA	FA		EX by FA	FA				
				GJ to EX				JP				
				FA				GJ				
				GJ to JP				EX				
				FA to JP								
Group F 18.03.05			FA		GJ to JP			FA			JP	
			FA		FA to JP			GJ				
			GJ									

Summary of the Observations of Group A

In the mapping table, Table 7.3 above, and written records of this group, to the researcher focussed on behaviour of the pupil HN, who was the only group member who did not have a K-element (Kinaesthetic) in his diagnosed characteristic learning style. The researcher thought it important to follow this pupil's progress during the two lessons when the group was observed, during the Kinaesthetic activity – HN is a shy, introverted boy, whose academic achievements are poor. He likes to listen and to receive explanations. In Table 7.3 above, the researcher noticed that HN is tries to avoid working. *It's very difficult for me; I don't know exactly how to do it'*. '. He passes the number cards to Jordan, asking him to perform the assignment for him, thus implying a technical difficulty. The data in Table 7.3 suggest that the group has an influence on HN; pupils take initiative and assist HN, propping him up during the performance of the task. *'Now we'll work together'*, says HK, verbally encouraging and supporting. He is assisted by another pupil, and then it is noticed that HN is working and achieving outcomes. HK praises him: *'incredible, you've succeeded!* 'The researcher noticed that the assistance HN received during this observation strengthened him, enabling him to work. He is able to accomplish the assignment, thereby experiencing a sense of capability, which in turn affects his self-confidence and performance.

Summary of the Observations of Group B

In this group, the researcher focussed on a situation which occurred during the Kinaesthetic activity, involving two pupils who were diagnosed with a K-element in their learning style, FD (K), and FC (VARK), and the pupil FE, who did not have a K-element in his learning style. The researcher observed that the K-element in their learning style was not manifested by performing the assignment, but by Kinaesthetic activities which were unrelated to the assignment they had been assigned. FD nervously taps his fingers on the desk, acts wild, throwing pencils and pencil-sharpeners on the desk. The remarkable point in this situation, is that is precisely those pupils who have a K-element in their learning style who experience difficulty and a lack of motivation to begin working, because the work that they were required to do involved reading and comprehending the instructions

card, and they also needed to plan the work proceedings. At that point, those pupils needed FE's (A) assistance. According to the teacher FE is a top pupil, an intelligent pupil, with sound planning skills. After FE read out loud and explained and the task this calmed both FC and FD and they work and become absorbed in the Kinaesthetic activity. Although he lacks the K-element in his learning style, FE works with them.

Summary of Observations of Group C

Each of the group members has the K-element in his learning style. None of them demonstrate a typical K-learning style. The power is evenly distributed in the group. There is a leadership struggle. At certain points, they cease working, wasting their time on trying to decide who will instruct, and whom they will instruct. GH is standing next to GG: *'why is it only you who decides, perhaps someone else wants to read, perhaps GF?'*GG gives him a stern look: and tells him that he is not the boss. They all work easily, and the group is dynamic. They pause only to argue about the leadership, the planning, and who should activate them. They prompt each other, nevertheless, they work correctly and diligently and enthusiastically. When two of them argue, a third one reconciles them. GF bows her head, saying: *'Stop arguing!'* The activity is not a problem.

Summary of Observations of Group D

EY and FZ (VARK) are very active. HO (R) is straying, trying to avoid work, *'Ouf, what a lot of rectangles!'* When EY tells HO, *'now its your turn, here's a few squares'* and passes the glue to HO, who pulls FZ's hand and says *'now you continue'*. HO does other things, and takes no initiative. They try to prompt him; he examines what they have done, realising they have worked well. He works only when prompted. They both have the K-element in their learning styles. They are concerned about producing results; they want to complete the assignment. EY and FZ were observed acting rather dynamically in their work. FZ asks him to hurry up because she sees that the other groups have already finished. Most importantly, the teacher's authority does not appear here, but it is their own concern and internal motivation which drives them to work diligently and rouses those who stray and helps them return to course. And it is obvious that they work autonomously.

Summary of Observations of Group E

This group includes three girls and a boy, all diagnosed with the R-element in their learning style, although only HM and HL, have typical R-learning style. FB and JQ both have the K-element in their learning style (both are classified as VARK). FB assumes the leader's role within the group. He demonstrates supportive leadership. *'We don't have to but it's not fair to leave you alone.'* This group experiences trouble with teamwork. HL is not willing to accept HM's authority. *'I don't need you to write the verbs for me…'*.HM herself is not willing to follow FB's leadership, asking him: *why are you taking so much time'.* FB (VARK) was observed to be prompting them toward more dynamic, active work. He hands JQ the pieces of paper, also instructing him to *'join two strips into a paper chain',* assigning activities. It is apparent that this group has no problem understanding instructions and that FB prompts and activates them to perform the Kinaesthetic work.

Summary of Observations of Group F

This group includes two girls and two boys. JP is the only one diagnosed with an A-learning style, while the rest all have a K-element in their learning style. EX is a typical K style learner, and Jordan Z. and FA both have a VARK style. FA assumes the leader's role. He approaches Jordan Z., saying: *'this box is no good, bring another box'*. *'Why didn't you write the verbs down…*' pulling the reins for the group. JP somewhat objects to FA's leadership. JP (A) shows her unwillingness to perform the assignment, but is given support by Jordan who helps her by doing all the work, only leaving JP to do the work in which she excels. '*…you know what? You know how to draw the appropriate drawing nicely for each verb and I shall prepare the roots in the correct slotted format and I'll write the verb forms that emerge'*. *'*.EX (K) works very slowly, but the group does not express any anger towards him. FA encourages him: *'You actually manage to construct a precise construct…*' EX describes his difficulty. *'I'd like to make the container but it's taking me a long time'*. In the second lesson, too, JP exhibits unwillingness and lack of motivation to participate in the assignment. *'I never succeed in pantomime*'. Once again, Jordan Z. acts as a source of persuasion and encouragement. '*Come on, cheer up. Actually its easy'*. The group encourages those who face difficulties, allowing them to engage in easier assignments, so that everybody understands and acts.

Table 7.4 Summary of Observations during Kinaesthetic Work in Class F

Group And Pupil's Name	Pupil hinders	Acts outside the task framework	Group leader	Gives Real help	Verbally Encourages	Helped by teacher	Helped by pupil	Works alone	Boring task	Unnecess-ary Task	Technical difficulty	Cognitive difficulty
Group A 22/04/04				OP	OP			OT		OT		
				OV				OP				
								OV				
								OS				
Group B 05/11/04		KU	KX	KW to KX	KX to KU			KW	KU			
		KU		KX to KU				KU				KU
				KW to KU				KX				
Group C 12/11/04								MG			NL	
								NL				
Group D 26/11/04				JT to NM				JT				NM
				JT to JS	JS			NM				
				JT to NM	JS to NM			JS				
				JS to NM								
Group E 03/12/04			KY	KY				MH				
			KV					OQ				
			MH	KY to KV				KV				
			MH					KY				

Group And Pupil's Name	Pupil hinders	Acts outside the task framework	Group leader	Gives Real help	Verbally Encourages	Helped by teacher	Helped by pupil	Works alone	Boring task	Unnecess-ary Task	Technical difficulty	Cognitive difficulty
			KY									
Group F 24/12/04					LC			All of the pupils				
								NK				
								OW				
								LB				
Group G 07/01/05			NJ	MI to NN				All of the pupils			NN	NN
			MI	NJ to NN								
Group H 25/02/05			MF	LD To ME	MF TO LD			LD				
								MF				
								ME				
Group I 11/03/05			JR	JR to LA				JR				LA
				JR to LA				LZ				
				LZ to LA				LA				

Summary of Observations of Group A

This group includes three girls who all have the K-element in their learning style, and a boy diagnosed with an R-learning style (Reading/writing. Unexpectedly, it is apparent that OV, who has an R learning style, is the one who practically assists OS, and even expresses his satisfaction with the Kinaesthetic activity. OV: *'Ouf! It was fun to work and build things in those tasks and it's a pity the lesson has ended'*

During the Kinaesthetic activity, it seems as though all group members willingly perform their work. None of them avoids working, and there are adequate results. Although at the beginning of work OT expressed her lack of desire to perform the assignment, once she receives encouragement and began working, the task becomes attractive for her and she worked diligently. The group works willingly. Their products were accurate, and nobody avoided working. . The researcher concluded from these three characteristics that the Kinaesthetic work had helped the pupils. This assignment examined the application of the material they had learnt in the part of the lesson with the presentation. Their ability to work alone and perform the Kinaesthetic work successfully proved that they had already understood the subject matter.

Summary of Observations of Group B

This group includes three boys; two of them had a K element in their learning style. The group also includes another boy, KU, who was diagnosed with an A-learning style. Eventually, all the pupils completed the assignment. The Kinaesthetic activity assisted them to master their knowledge of the subject matter, although at the beginning of the work, KU (A), wasted some of the time because he was engaged in activities not related to the assignment. He expressed his boredom with the assignment. KU: *'I've got a problem. The work in the exercise book bores me'*. Even when he is engaged in the assignment, he expresses a cognitive difficulty. He is not certain that he is working in the right way, showing KX every bit of activity he has completed, asking him how to continue from that point. The assignment helped him, because eventually, he performed it correctly, and was indeed working.

Summary of Observations of Group C

This group includes two pupils; MG who is a typical K style learner, and NL, whose learning style completely lacks a K element. MG works willingly, and has results. He even takes pride in them, showing them to his classmates. He does not avoid working, and takes interest in the assignment. *'I love these tasks. I build the table and the cards by myself'.* NL, whose learning style lacks the K element, demonstrates a technical difficulty in performing the assignment. *'I can't succeed, it comes out crooked, I understand the subject matter but its difficult for me to build it and to do these tasks. I'm a bit annoyed. I can't succeed with anything. I've got no desire to do these tasks. I can't do them so well and I don't know why'.* Nonetheless, she works slowly, but it is not clear whether she completed her work.

Summary of Observations of Group D

This group includes two boys who have an R learning style, and a girl who has a VARK learning style. It is noticeable that although her learning style contains a K element, the girl, expresses a cognitive difficulty at the beginning of the work, when she says: *'I can't succeed in doing anything, perhaps a little, its difficult for me to match them, because the verbs seem to be the similar. I don't know the exact meaning of each verb, it's not so clear to me, but I think I'll succeed'*. Indeed, upon receiving a bit of cognitive assistance, she works properly and completes the assignment. It seems that the Kinaesthetic activity helped her. She works diligently, and successfully completes the assignment. Both boys understand and work well.

Summary of Observations of Group E

This group includes three girls, and a boy who all have a VARK, learning style. The pupils appear very active, all of them raising ideas as for how to begin the assignment, *'Do you think a circle would be better?'* MH: *'No, I think that a square is good'.* They all work, initiate, suggest ideas. There is no difficulty, nor is there avoidance of work. The Kinaesthetic activity helped them to understand the subject matter; they work diligently, the outcomes are good,

meaning they have understood and the activity helped them to establish the subject matter.

Summary of Observations of Group F

The group consists of three girls and a boy. All of them have a K-element in their learning styles. It is evident that all of them work, finding the activity interesting. Despite the expression of interest and willingness to assist, this group's members exhibit a desire to cope with the challenge by themselves. OW requests a coloured crayon from NK. NK hands her the crayon and looks at what OW has done. OW covers her work with her hand, and tries to continue working alone quietly. They work, there are results, no-one avoids the work. They do not experience the assignment as boring, but as helpful.

Summary of Observations of Group G

This group includes two girls and a boy, all of whom have a K learning style. It seems that the girls begin working with no hesitations and distractions. NN is not confident as to how to accomplish the assignment, and expresses cognitive and technical difficulties. NN requested MI's assistance: *'you always know how to make things accurately, and you also know the subject matter well'*. MI explains how he should handle the assignment. Both girls offer him help, and once the assignment is clear to NN, he begins working. All group members work properly, and complete the task; they work diligently, absorbed in their work. This means that, the Kinaesthetic activity assisted them.

Summary of Observations of Group H

This group includes three girls. ME's learning style is K, MF's learning style contains a K element, while LD's learning style does not. All the girls in the group are working. They even planned the work process beforehand, and then they accomplished the assignment, even finishing earlier. No manifestations of distraction from work or avoidance. All of them were absorbed in work, thus the Kinaesthetic activity obviously assisted them.

Summary of Observations of Group I

This group includes three boys, two of them have a K element in their learning styles, while the third boy's learning style is classified as V. The pupil with a V style clearly expresses cognitive difficulty. He asks JR why he drew the lines in both direction, and JR explains that from the same root, it is possible to construct different forms of the verb. After he receives practical assistance from the other group members, he approaches the assignment and accomplishes it. The other members work well. The pupil who expressed a cognitive difficulty at the beginning of the activity, demonstrates his adherence to the task despite the difficulty. He takes an interest and inquires. They, assist him. Their work yields outcomes, proving that the activity helped them.

APPENDIX 8.1: PROTOCOLS OF OBSERVATIONS OF LESSONS WITH THE PRESENTATIONS

Protocol of observations in Class E1 in lessons with the presentation

22.10.04

The teacher T.
Lesson 1 – Revising the subject matter, verbs

The teacher enters the classroom, asking everyone to sit in their places, explains the study, and presents the researcher. Presentation that came to establish material already learned is projected on a special board. The pupils are watching (1) and getting excited.

Two sentences appear
- What word is identical? Read phonetically
- All pupils point (2)
- EX_K (3) answered correctly
- In what was the word different?
- They think, FD_K (4), FC_VARK (4) GJ_VARK (4) - do not know
  and HM_R (5) answers correctly.
- Three different verbs appear.
- What is different?
- Large numbers of pupils point (6)
- EX_K (7) answered correctly. And the table fills up with the root,
  time, body contracture, accomplished with colour and sound, everybody is
  watching.
- Appears a sentence, verb by side emphasis with colour (9).
- What is the verb in the sentence?
- The kids point (9).
- FZ_VARK answers correctly (10).
- What are the components?
- HN_VAR answers correctly (11).
- Components fall into place with a sound; everybody is listening (12).

- A sentence appears again, lively participation (12).

First lesson with T., she explained the material well, at the end she said: "I've been passionate about, usually they are staring into space and do not participate, and today pupils who usually do not participate took part ". She turned to the assistant with a question, if she also felt the difference. "I'm excited for the next hour".

29.10.04

Lesson2 -

Three sentences appear with motion; everybody is looking (1)
-What are the verbs? EX_K(2)
-the answer in red falls into place, they all look(3)
Timeframe, body, root and contracture fall into place with sound, all eyes on the presentation(4)
The rule appears, the teacher asks GF_VARK(5) to read out aloud, GF refuses(5) FE_R(6) wants to read, they are copying from the board(7)
Everyone is listening (7), look at the presentation and point (8) she is asking also those who do not point. Come to the sentence, she explains each sentence separately, and they are fascinated by it (9).
Enters the frame and they are looking at (10), within the frame is written the rule. And now they write(11) except for FC_VARK(12), who is looking for something under the table
Enters new format, they have to put verbs into a table, kids are excited(11) and point, everyone wants to answer and answers correctly(12)
Everyone listening (7), look at the presentation and vote (8) is also asking those who do not vote. Come to trial, she explains each sentence separately, and are fascinated by it (9).
Enters the frame and they looking at(10), within the said rule. And now they write (11) except for FCVARK(12), looking for something under the table
enters a new format, we have to put verbs table, kids are excited(11) and point like everyone to answer and answer correctly(12)
Enters the rule, they are asked to read aloud together, it seems they do not understand what is written at all - by their reading, they does not understand the words (13).
Words are Incoming and they try to read (14).
And every time something happens, everyone without exception is looking. (15)
When the presentation did not move, FD-K (16) and FC-VARK (17) do not participate.
HM-R (18), once again do not participate. When the presentation ended the girl HM_R said she would go to class and sum up the material.
Repeated questions in the presentation we'll see to that they still did not understand what is a format, although it was repeated several times (19).
Teacher's Note - T. said at end of lesson that pupils have difficulties in understanding, and after she will explain, they still do not understand.

5.11.04

Lesson3

The pupils are tired after sport lesson, until they sit down, now the presentation is activated, a picture appears, everyone is looking at (1), a sentence that fits into the picture. The kids read the text to themselves and look (2).

- What is the verb? FB_VARK answered correctly (3)
Verb phrase get red colour, they look and enjoy (4).
- What is the construction? HL_R (5) answers correctly.
Enters a second sentence related to the painting,
- What is the verb? GJ_VARK (6) answers correct.
What is the construction? EX_K (7) does not know, FA_VARK (8) answers correct, an animation appears, the stars fall down, pupils are smiling (9).
What is the verb, pleases them, it gets a red colour (10)
FC_VARK (11) and everyone is happy, the teacher smiles and he is happy.
- What is the construction? EY_VARK (12) answers correct.
Now enters the sentences about Lulu the Clown, and the clown enters and makes a funny animation, everyone without exception, look at the clown (13)
The teacher stops the animation and asks HM_R (14) to read out aloud the story, HM reads beautifully.
Now questions arise to identify the construction, it seems it's a bit difficult for them.
GF_VARK (15), GJ_VARK (15) and HN_VAK (15) did not answer correctly.
The lesson was over, everyone smiles

12.11.04

Lesson 4 - incoming verbs table

Visual event - 43
Auditory event - 32
Writing Reading event - 9

Fourth lesson with T.

Elections are held on this day, pupils are very excited.
They revised the root and root properties but T. again does not work in the order in which verb properties appear in the presentation. She asks them to draw the table that is projected on the board, explains that first we'll fill in the notebook and then look if we were right. Nice idea, it asks to copy the table from the board, it takes them a long time, until they find the bar some are missing tools for writing, FC_VARK (1) do not write, FD_K (1) and JP_a (1) are busy with other things,
At one point the teacher continues to project the presentation, some of them have not finished writing, and therefore do not observer (2).
The verb with the property appears, and they need to know the properties first. Teacher request them to guess which place the verb should be placed in the table, they think and write (3), HN_VAR (4) answered correctly, and he is pleased, HM_R (4) and EY_VARK (4) also. When the verb goes into its place in the table, they are very satisfied (5), and the pupils answered correctly say "There!"
Work continues until the complete filling of the table, they work well (6)

19.11.04

T. held on this day classroom test. After THE test work the pupils did a Kinaesthetic work.

26.11.04

Lesson5 – "Monsters" Different meaning to different construction

T. - lesson No. 5

At the beginning of the lesson T. ask them what the seven constructions are.
Before the presentation came FA_VARK - (1) is talking, and only after the presentation came on he looks (2). She asks to open a notebook and copy the verbs and add additional "Seger" at each construction. Pupils now open notebooks and writing tools, again it takes some of them long, but everyone is copying to the notebook (3)
T. says that they ask: "Is there a lesson in the library tomorrow?" And they are glad when she answers yes. Although by now there were no paintings and monsters.
She says she usually she sees opacity in pupils' eyes – in regular classes, but not here, they are excited and participate.
T. said L. made a test and her scores jumped.
All pupils are writing seriously, she explains the meaning of the verb, after a few minutes, the boy FC_VARK (4) points and wants to participate, T. turns to him with gladly, because FC is a very weak pupil. He answers correctly (4) and he, she and the other pupils are very pleased.
HN-VAR (5), apparently weak pupil, he also knows the material, and answers correctly.
They are happy when the sentence with the noise (6) appears, the monster appears and they all get confined (7), you see in their faces that they are happy.
They are trying to figure out what to complete. When there were short sentences it was easier for them. JP_A (8) knows.
The boy FA_VARK (9) - says on a simple picture it is not pretty. It seems he looks at the pictures.
FC_VARK (10) - The weak pupil, answers correctly.
GG_VARK (11) sharpens pencils, now he is reading (12).
FA_VARK (13), does not participant at all.
FC_VARK (14) - draws the monsters.
All the kids are excited about the monster (15)
GG_VARK (16) - said the answer straight, but he did not participate.
FC_VARK-continues to draw monsters, it does not mean he does not listen, have to check whether he is a pupil how needs to write during the hearing. Or maybe Kinaesthetic. T. - ask what is the main idea of the story, asks to think and point, at this stage the last monster comes up, everyone looks at.
JP_a (18) joys when the monsters appear, and she answers correct (19).
The boys say: "What fun these monsters" the love the most when the monster changing colours (20).
The pupils smiled at me as they left the classroom. And T. looked happy from the monsters lesson. When the sentences were long and complicated than one verb, two or three, it was difficult for the weak ones: EX_k (21), FC_VARK (21), GJ_VARK (21) and the have touch detachment, gave up in advance and did not participated.

3.12.04

Lesson 6 - Law, passive construction + table + Ambulance

T. - Lesson No.6 First hour

Two sentences and picture appear. All the kids listen to (1), the teacher asks FZ_VARK (2) to read.
- What is the construction FE_A (3) answers correct. Passing ambulance makes a sound, everyone listens (4), the story goes on, two more sentences came on, with colours and movements, the pupils are looking curiously (5).
What is the construction HK_VAK (6) did not answer correctly, GI_VARK (7) answered correctly. The rule came on, the teacher asked HM_R to read (8). HM_R read the rule, and now the teacher asks the pupils to write the rule into their notebook. All the pupils copy (9) except HK_VAK and FD_K (9) who talk, EX_K asks FZ_VARK a ruler (9).
Now begins a new story, everyone without exception, looks at the story (10), every time comes a sentence, they read all together (11) from the beginning and watched (12). Now it depends on what the teacher is doing with it. At that point they are copying the rule from the board (14). Now she takes the rule, explained according to sentences. FD_K (15) and EX_K continue to talk.
Come on the rule of "Nphal". Now there is a debate, the teacher explains, the kids goofing and transfer objects (16). Now again all of them copy quietly without exception (17). Now they draw the table (18). The verb appears is the table and we are waiting for them to fill the table. That activity is good for them. FC_VARK (19) participates also.

24.12.04

Lesson 7 - Saving words, sentences, monsters, construction.

T.s lesson. Presentation No. 7 (after two weeks of absence) at 8:00.

- The teacher asks "What do you mean save? The pupils participate (1). HN_VAR (2) is weak, shy and does not listen, busy with GG_Vark (2).
Teacher is talking to one group. Now when a picture appears they all look (3), including HN and GG. She explains on the verbs and they do not listen (4), they look at the presentation (4).

We got to the game, they were divided into groups, each group in turn responded and received points, all pupils participate in it (5), they see the presentation, think and answers, and they are really concentrated and play.
HO_R (6) is angry that he did not get points because he did not answer correctly - the teacher prepared a presentation, now all of them are copying from the board (7) - the presentation written by T., they are quietly copying and working.
Nice idea to bring a floppy with the work.

7.01.05

Lesson 8 Presentation - Recognition construction "is Yesterday"
T. at 8:00

EX_K says: Now I know language very good.
T. misses the point, in the presentation it said "he-yesterday-in hart" and that repeats itself, and she insists "male, 3rd body, past tense".
They all look without exception (1)
- What is the first verb? EY_VARK (2) answers correct, but when she wants to tell the rule " male, 3rd body, past tense " It confuses them, FZ-VARK (3), JP_a (3) do not answer correctly.
In the presentation more pictures and sentences, the task is repeated, and the pupils listen and enjoy.
GH_VK (4) says that they already have seen these pictures, it's true, pictures and stories were already in previous presentations, but here the tasks are different.
Heart that appears attracts their attention (5), she asked to copy the verb, and specify the construction and root letters (6) all work, and who finishes is pointing.
She asks to copy the rule, and they copy quietly (7).

Conclusion: It is hard to impart new habits to those used to teach a certain way and believes in their way.
Now she explains what to do on the page, and they mostly do not listen (8).
They sit and work well (9). They had a very hard time. The page she'd made, I talked to her about it at the end of the lesson and she agreed to teach the next lesson by way of presentation.

25.02.05

Lesson B- Presentation "food poisoning"

Lesson with T.

We talked about construction now we are talking about something new
Except HN_VAR (1) without exception all are looking quietly (1).
Came the reply everyone is looking at, the kids point, and some are looking, HN_VAR is scribbling in a notebook.
The teacher asks the GF_VARK (2) - answered correctly.
When the answer come GF_VARK (3) was very satisfied.
Now they look (4), HN_VAR (3) is playing with his booklet
Other participate looking and pointing. HN again is writing something in a notebook.
Others look and listen carefully.
Now the teacher asks them to write in their notebook. They opened a notebook and wrote (4), including HN_VAR.
Onscreen appears food poisoning, "Bacteria multiply in our bodies "
Teacher - is there a clean verb?
HN_VAR (4) - busy on other thing and asks a question related to something else.
FA_VARK (5) - says there is clean verb. The sentence moved everyone looks at (1).
Teacher - if there is a clean verb in the sentence, then it is the object.
T. - asks to copy the sentence, they are copying (6) and she explains.
T. - asked how to connect the overhead projector.

It means she enjoys from the listening and the silence and perhaps even from the results.
HN_Var sits next to GI_VARK (7) who is looking for something in his
pencil box and is not interested, even HN_VAR (7) is not interested.
T. - asked to copy to the notebook. GJ_VARK (8) continues his search.
They copy (8). Is writing during the presentation bothers them?
HN_VAR - what to copy?
Teacher - asks to read the rules aloud.
HN_VAR - repeated several times in his head.
Teacher - asked to write the sentence again.
HN_VAR - ask what to copy.
Teacher - copy the following sentence...
Teacher - asks to do it all – subject and object
They copy the following sentence (9): "The monster diarrhoeas non-stop" (the work was on healthy eating habits) It made them happy and they again need to write the subject and object.
HN and his friend are occupied in pencil box.

The presentation ended. T. writes on the board five sentences. They copy quietly.
Beginning of the lesson T. told me they do not need to learn the parts of the sentence and whether it's okay if in the rest of their lessons they continue about weights and here they will deal with it.
In my opinion it's better for research, to see if only these lessons bring to the attention of the pupils the material.
They solve the sentences object and subject.
FE_A (10) – answered well.
HM_R (11), FZ_ VARK (11) and GI_VARK (11) - Excellent
Seems to me that everyone except HN listened to this lesson, attended and understood. It was really superior.
I asked T. if she liked it and if she wants to continue and she said yes. It's a great achievement for me.

11.3.05
Lesson b - rehearsal

The overhead projector arrived without a cable and we cannot perform a standard lesson, they asked T. why there is no lesson with the presentation on Monday and other days.
They met me outside after last week there was a no lesson, and were very happy. Three pupils asked if today will be the lesson with the presentation. When I said yes, they are very happy.
Today is Friday, repeating presentation b

Two sentences appear the pupils observe (1).
- What's the identical word? EY_VARK answers correct (2).
The word gets red paint, all are looking (3)
- How is the sentence in past tense? GF_VARK (4) answers correctly.
- How the sentence in future tense? HL_R (5) answers correct, everyone is looking at the sentences word gets colour gets. In the three sentences present, past, future verb changes, while the adjective does not change, everybody is watching (6). The rule raises slowly the all look (7). The teacher asks the pupils to copy the rule to their notebook, all copy (8) except FD_K (8) and HN_VAR (8), which does not perform the writing task.

Presentation explains what he is a clean verb, and what is a verb accompanied by letters.
Appear two verbs, all the kids are looking (9)
- Which of the verbs is a clean one? GG_VARK (10) answers correctly. GH_vk (11) answers correctly.
A story about food poisoning begins.
- Who is the clean verb? FE_R (12) answers correctly, the same way appears more sentences, all the kids are watching, who is asked answers, they point and participate in alertness, laughing and happy about the topic (13)

18.03.05

Lesson q - Expressions and idioms, punctuation, parts of the sentence, identifying construction

T. 8:15 am

T. - What are we talking about? Everyone is concentrated (1).
HO_R (2) knew in conversation what the phrase is.
When the sentence appears, they look and concentrate (3), now they need to copy the idiom, its interpretation and the sentence and to punctuate (4).
Periods and commas attract the attention of pupils (5).
All the pupils are looking when the proverb appears (6).
FZ_VARK (6) - said the correct answer.
JP_a (7) knows and is listening
They all write and concentrate, copying and punctuate (8).
GL_VARK (9) knows.
HN-VAR answered correctly (10).
T. - What is it wholeheartedly?
HO_R (11), GG_VARK (11) answered correctly.
The example appears, JP_a (12) is reading, everyone, without exception, are looking (13).
FE_A (14) answered correctly on the commas.
Except HN_VAR (15) everyone is looking (15).
T. - Why have commas around FE and Roth?
HM_R (16) – answers correctly.
The proverb "half-hearted" appears; they are all participate and answering (17).
HO_R - wants to tell.

Now they are copying, punctuating, and do so gladly (18).
JP_a (19) and HL_R (19) - finished first to copy, and they want to answer.
GH_VK (20) - explains, they talk, and then commas appear.
Expressions come up and they are pleased, it comes with sound. (21)
T. - Do you want another presentation with idioms?
All of the pupils point.
Now they have to write a story with the expression and do so (22).
EY_VARK reads out aloud (23) - "CM speaks half-hearted to mother, to the teacher speaks one thing in his mouth and another in heart, but to the pupils CM speaks when his mouth and heart are equal."

Protocol of observations in Class E2 in lessons with the presentation

T. second hour

22.10.04

Second hour with the same teacher, the teacher introduced me to the pupils, she asks them to behave naturally and to cooperate. Explains that today is a repetition of what we learned last year.
Presentation goes up and everybody is excited (1).

Two sentences appear that include identical word,
- Who knows what the identical word in the sentence? The pupils want to answer (2).
- BH_VARK answers correct (3), the words get a red colour,
What's different?
Kids do not know (4) what is different, until EW_VARK (5) answers correctly, right away arrows go out of the words and an explanation is written above, the eyes of all pupils are on board (6).
Verb properties comes down with sounds and colours
They continue to look at the presentation (7).
A sentence with verbs aside appears with emphases on.
-What is the verb? CL_VARK (8) answers correct
What are the verb components?
- CN_VA (9) says root, CK_RK (10) says body and AE_VRK (11) gives the time and construction.
- Verbs appear on the table with the components,
- What's different? BF_VAR (12) do not know, AD R (13) answers correct
- Again different verbs
- What's different? DQ_VARK (14) answers correct
- And verbs again
- What is different? CM_VARK (15) answers correct
- Entered a sentence.
- What is the verb? EU_VARK (16) answers correct
A verb runs down and it repeats itself, lively participation (17)

T. said: "All but two pupils, BJ_VARK (18) and BI_R (18) participated nicely". One girl asked if we'll have more such lessons. T. said "yes", and the girl said, "What fun"
T. repeated again that it was really fun.

29.10.04

Lesson 2

It takes time until the pupils find their place, and sit, CK_RK and DQ_VARK are arguing about the place. The teacher arranges the subject and makes a repetition of what learned last week, BJ_VARK (1) does not sit in place. Pupils still are not quiet (2).
Presentation appears, they are already beginning to look at the sentences coming from the right. All the kids watching (3) BJ_VARK (4) is looking for something.
-What are the verbs? DS_k (5) answers correct.
Red verbs fall into place and they look (6
- What is common? DR_VR (7) says root, EW_VARK (8) says time, and DP_VAK (9) says construction. Template with the root, time, body and construction comes on with colour and music; all the kids are listening and watching (10).
The rule appears and all the pupils are looking (11), the teacher asks them to read out aloud and they read (12), except for BJ_VARK (13) who did not read. Now she asks the pupils to copy the rule to the notebook, all copy (14) except BJ_VARK (15) and BI_R (16).
Entered a verb that is changing to a pattern, they all look in interest (17). Now we have to put the root: "thought" to the pattern and tell what verb is the outcome, AA_K (18) answers correctly. Word fall into template all the pupils' eyes averted to the overhead projector (19).
Now comes another verb "wrinkle", BG_R (20) answers correctly and is satisfied that the verb came in and it's true. The root "against", now the teacher turns to BJ_VARK (21) and she answers correctly. The teacher and the pupils are very pleased that she answers correctly.
Again come a root and the word came down, AB_ARK (22) answers correctly. Now "heard" how is it in the construction pattern? DQ_VARK (23) answers correct. So it lasts another verb longer, everybody's happy (24). The rule comes up, they are reading (25) and writing (25) except BJ_VARK.

5.11.04
Lesson 3

On entering class one of the pupils said its fun with these slides.
Beginning of the lesson the teacher asks to write only the verb and the construction.
- DT_VAK – answers correctly (1), all pupils are writing (2) the verb and the construction.
- BJ_VARK (3) knows the verb but not the construction.
- Teacher – Question: What is the format? They look at the presentation when it is turned on and write (4).
- Now they do the test.
- Lolly the clown, who makes faces, pulling their attention (5). One of the pupils is copying the clown.
- The teacher asks to write the verb in the "Hitpael" construction, she is standing and the clown is projected on her. They laugh.
- Writing is unnecessary now.
- The principal comes in, they are pointing with enthusiasm at the presentation. Presentation ended and the teacher goes to teach on passive construction. (Not sure why).
- Question: What are all seven construction, CM_VARK said in the order listed in the presentation (6), T. arranged in another order she is used to. Construction order is important to her. There's a problem, there is a conflict with what appears in the presentation and what the teacher is used to.

They do the test - I need to find what a test it is.
The teacher explains and the girls DQ_VARK and BJ_VARK talk to each other (7). The teacher is worried that the kids do not know the material, I told her it was okay, she commented that in the class there is a problematic pupil, but emphasized that this lesson she sat quietly and studied - that is BJ_VARK.
T. is nervous. She feels as if she was standing to a test, she said that this week she explained to them several times.

12.11.04

This lesson was a rehearsal on the previous lesson, because of the test.
T. did not come, an assistant (soldier) teacher took her place. A picture appears everyone stop their occupations and watch the presentation (1). Appears a sentence that tells a story. The soldier assistant asks CM_VARK to read the sentence on the picture, CM_VARK reads (2) and the kids are looking (2).
- What is the verb in the sentence? AA_k (3) answers correctly, the verb
gets red colour, and everyone is looking (4).
- What is the construction of the verb? Number of pupils point, BF_VAR (5) answers wrong, AB_ARK (6) answers right. Construction goes up, entered a new sentence that continues the story. The assistant gave BJ_VARK to read and she refuses (7). DT_VAK reads the sentence (8).
- What is the verb? DR_VR (9) knows, that verb is painted in red (10); all listening and watching what was going on (11).
- Which construction? BG_R answers correctly (12) and the construction goes up. Now stars get down on the image, all without exception look with pleasure (13). Appears another sentence, CO_VARK (14) is requested to read; all are looking and listening (14).
The teacher comes back to the classroom.
- What is the verb? AE_VRK answers correct (15). The teacher squeezes and the verb went red.
- What is the construction? AD_R (16) answers correct. The construction goes up and joins the other constructions, all look at the movement (17). The teacher asks the pupils to record for themselves all the verbs they see on the board, they do, except for BJ_VARK (18), BI_R (18) and CK_RK (18) who are busy talking and everyone else write (18). After a while that the event starts happening she stops and asks them, everyone answered correctly (19), and they run the presentation to see if they were not mistaken, all are interested (20), now she asks to find the construction and write in the notebook, they are engaged in it (21), and want to answer.
DP_VAK (22) answers correct, and everyone is pleased (23)
BI_R (24) does not participate as the presentation is static. And CK_RK (25) also does not listen but speaks.

19.11.04

At beginning of the lesson there were some arrangements that did not belong, then the presentation was activated and the teacher asks to draw the table in their notebook.
They listen and copy (1) the table. BJ_VARK (2) does not copy; she continues to play with items on the table. Below the table appears a verb surrounded by rectangles of the components of the verb. "Root, time, body construction", the teacher asks them to fill the cells in the notebooks, put the verb its proper place in the table. Pupils are cooperating (3), now she asks AB_ARK (4) what is the root of the verb? AB_ARK knows the answer, in the same manner asks CL_VARK (5) what is the time, answers correctly; they look at how the

components fill the rectangles. What is the body – she asks CN_VA (6), she does not know. Now what was left is the construction, CK_RK (7) answers right and the verb goes right into place in the table.
- When CK_RK answers correct and the verb went into the table, he is very pleased and puts up his hands happily.
There is an error in the presentation, that error attracts the attention of pupils, the same way they cooperate (8) and the lesson ended happily except BJ_VARK (9) who did not recorded anything in here notebook but was asked and answered correctly. (10)

26/11/04

Second lesson with T. - 09:00.
The lesson began, and the pupils are running and looking for a place to sit. T. says to set at the regular places.
T. asks: Who wants to go back on the constructions? - CO_VARK (1) answers correct.
As they constructions appear they were all looking at the presentation (2)
BG_R (3) - all have root time body and construction.
T. - ask why the constructions appear that way?
DQ_VARK (4) - do not know
T. - What is common to "piel" and "hipeal" verb? No one knows (5)
T. asked to copy the structure to the notebook, and put into the structure a different root – "closed". The pupils open their notebooks slowly but in the end everyone except BJ_VARK are writing (6).
BJ_VARK has no notebook.
After sport lesson they are not so concentrated.
They all participate (8), now she stops the presentation and T. asks about a root in a particular construction and apparently the root is meaningless. Now it's after the talking and the pupils do not participate or listen (9) including the girl BJ_VARK.
Here T. asks to write the verb that's in the sentence into their notebook, not all the pupils joining forces to the mission (10).
The Noise "Different construction different meaning" attracts their attention (11).
The monster came up and they enjoyed (12).
DT_VAK (13) - Target dream - that apply.
Again they are moved byte monster (14), that the first time BJ_VARK (15) is reading and pays attention to the presentation.
CO_VARK (16) -answered correctly, and BJ_VARK (17) knew.
BJ_VARK (18) tries to think, the girls (Arm A and BG_R) copy the sentences although they were not asked to (19), they say it is beautiful BH_VARK (20) is not looking, they are very intrigued. (21). They are very fascinated by paintings (22). They laugh at the monsters, they say the teacher happily that they copied the sentences, 13 sentences. She asked them at the end, what was the subject of the lesson, BG_R said, "Different construction different meaning" (23).

3.12.04

Second hour with T.- after sports lesson.
T. begins with the question: What are the passive constructions?
A group of pupils (EV_VRK (1), CK_RK (1DT_VAK (1)) are quiet today, they talk, and even the presentation was on they were not so concentrated (2), when the ambulance arrived, they turned their gaze (3).In the presentation there is a continued story, appears sentences painted with the verbs colours.
What is the construction? BI_R (4) know, the construction appears in red, appears in a new sentence with a picture, the kids watch (5).
What is the construction?
CM_VARK (6) answers correct. Again entered the construction with red colour and punctuation.
The story with images and phrases with colour highlighting continues, the pupils look at and participate in (7).
What is the construction, BG_R (8) answers correct.
In the same way more sentences appear, the kids are watching with fun (9) and now the teacher asks who knows an active verb in "Nipal".
The girl DQ_VARK (10) adorns the notebook, and also the girl next to her DR_VR (10). They are not listening to the teacher who is interested to hear is an active verb in "Nipal" (entered).
BJ_VARK (11) talks scribbles on her hands. All the girls: DR_VR (12), DQ_VARK (12), BJ_VARK (12), CN_VA (12) and CO_VARK (12) are not listening.
The teacher asks to copy the table to their notebook, check the verb and immediately to check which construction, active or passive. Writing is problematic, some are not copying (13), some copy quickly and finish and want to see what the presentation shows.
The teacher actually is talking to the boys (EV_VRK (14), CK_RK (14), DT_VAK (14)) who did succeed to copy the table and therefore cannot participate, some of them copied, and some finished.
AD_R (15) never stopped painting, and she does not participate.
Now they work well (16) except BJ_VARK (16).
In comes the rule and they call out (17) and copying (17) except BJ_VARK and AD_R (17).

24.12.10

Lesson Two 9:00
The teacher explains to pupils that today they will learn about the option to save words, instead of saying two words you can say one, the kids who just got into class still are not concentrated (1) the teacher handles discipline issues.
She runs the presentation; appear two sentences with colour highlighting and drawings, the pupils are watching (2) the teacher read them aloud.
- How to submit made for cooking in one word?
- CN_VA (3) answers correctly, the word sit down in colour in the appropriate place in the sentence, they are looking (4).
- What is the construction? CO_VARK (5) does not answer correctly, BF_VAR (6) answers right, and the construction went into placing on the figure. They watch (7).
- comes a rule included with the sounds, the teacher asks BH_VARK (8) to read, he reads and the pupils listen to him(9), now she wants them to write the rule, and they are writing, (10)
Today also BJ_VARK (11) writes.

Again two sentences with a picture appear, the pupils look curiously (13).
- In one word? BG_R (14) answers correct, the word came in place in the second sentence.
- What is the construction?
- AE_VRK (15) answers correct and the construction falls down on the figure,
Now comes the rule and so it went on, the pupils cooperated in all tasks (16).
Now they need to start group games. On the board group scoring is recorded.
All pupils are pleased with the mission, DQ_VARK and (17) BJ_VARK (17) also, participate and point, worked well (18)

7.01.05

Lesson two - with T.

T. asks them to repeat the constructions. There is some kind of rustle, and she worries it will be quiet (1). They look at the sentence. She asks if he recognizes the verbs. She asks them how to identify.
Having a conversation, CK_RK (1) and DT_VAK (1) sit at the end talking about the silhouettes appeared on the head teacher, as she stood before the presentation, she is flowing with it.
Two sentence with a picture appear, all the kids look and are content (2).
- What is the verb? AB_ARK (3) answers correctly.
- Now appears a heart that says "He is yesterday" it means that the pupil will think in his heart of what is the verb "yesterday" 3rd body, single.
Everyone thinks what he did yesterday and laughing when the monsters appear (4).
When CN_VA (5) answers correctly, comes a small heart with the answer above the verb, they copy the rule and the heart "He is Yesterday" (6), so it goes on, no adverse events (7).
EW_VARK (8) knows the material (8), she also writes and participates (8).
The teacher added more verbs, gave verbs and construction on the board, they worked well (9), there is a problem with "He is yesterday" because the teacher does not work that way, she says they really love the language lesson and last week when there was no lesson with the presentation they were sad and she had to teach something other than language lesson - they refused to learn the language without the presentation.

25.02.05

Time: 9:00 Presentation B lesson with T.
This is usually a better class.
T. - talking and the girls AA_k (1), AD_R (1) and DQ_VARK (1) talk. Rest of the class listens and participate (1).
They are asked to write in the notebook and copy.
The words that I was switching on and turning off I saw that they look at it satisfied (2) now they are copying (3).
BJ_VARK (4) is of course without a notebook.
DQ_VARK (5) is not looking and not listening.
EU_VARK (6) - knows.
Teacher - asks to add a title.
While writing, they write the lessons subject (7), and she asks something about the sentence, I think that's her mistake, because they are busy writing the title.
EW_VARK for example is decorating.

They look at the presentation (8)
Teacher- is there a clean verb in the sentence?
AC_VARK (9) -answers correctly.
They ask– should we copy?
Teacher - Yes, they all copy except BJ_VARK (10).
EW_VARK (11) is painting adorns but also listens (check if she is Kinaesthetic)
- The problem is that while writing they miss the movement of the presentation.
EV_VRK (12) - does not answer correctly
AE_VRK (13) – know.
Teacher asks them to read aloud, they read (14).
DQ_VARK (15) lost her sharpener, continues to search for it and do not write.
They were wrong in the second sentence, they need a correction pen and it takes time.
EV_VRK (16) and his friend CM_VARK (17) are playing but write.
CN_VA (18) - wants to explain
CL_VARK (19) – answers correctly.
The pupils are excited from the sentence - the monster has diarrhoea non stop, (the work was on healthy eating habits) they did not stop talking about it (20).
Now they are copying from the board (21) and solve five sentences.

From the last lesson it is clear that there is a disruption when they need to transit from looking at the presentation to writing in the notebook.
On one side they like to write and decorate. Some pupils are slower and some are fast and there are those who love decorating, so when moving on not all are in focus. In the cases that everyone finished there are always those who do not listen. Especially in a situation where they were asked to write something and the teacher continues to talk.
Some pupils are busy writing and do not listen. (Teachers need to manage the class, you can ask them to turn over the notebooks at a certain moment, and then continue the presentation. It's the responsibility of the teacher).
Another problem is the problem of preparing teachers to work with the presentation.
The presentation was written by one of the teachers according her way of teaching the material, and even given the presentation in advance and T. certainly learned the presentation before class, there is still a problem that the spirit of the lesson is not clear. Here for example, the idea was that pupils while analysis of the sentence will understand the issue of food poisoning.
At here first lesson T. did not take that into consideration, and in the second lesson she suggested that it's about food poisoning, and dealt in the sections reading comprehension.
Pupils very glad I came and wanted to help me connect the computer, in general it seems to me they care about what happens with this lesson.
Today the board fell and one of pupils asked me:" are you all right, the board does not matter, and you're all right?"

11.03.05

Year 2 with T. at 9:00

Presentation B - rehearsal

DQ_VARK (1) pointed and answers correct answer. In C presentation appears the witch and that interests them (2). CK_RK reads (3).
She asks what is the object - and they do not know (4).
They want to say and point (5).

They have a mess at their head, but because there were no classes therefore they do not identified the object. EU_VARK (6) knows, and he says it's the operation.
AB_ARK (7) is not listening to pupils' answers.
The teacher asks AD_R (8), and AD_R does not know.
They shout "pages Ko"
She asks to put down hands. The question is why they do not know.
They do not listen (9). AD_R (10) is lying on the table. On-screen charts and sentences that pass, and it bored them. Appears a sentence and up is written the object, they do not remember (11).
The teacher asks to copy the sentence and the chart - they ask under which heading and copying (12) except BJ_VARK (12).
CL_VARK - I ask whether the material is clear to you, because you're writing. She says yes.
DQ_VARK - says that writing helped her a bit.
AD_R - it helped me that I wrote. Continue: "dog retrieved soap from the bathroom."
The teacher asks them to copy the chart (CL_VARK, DQ_VARK and AD_R are copying (13)).
Now the pupils entered to take pictures for Deborah's birthday, teacher and lesson was interrupted.

18.03.05

T. - second hour with the second class, Expressions.

The phrase "one heart and one mouth" comes up.
Everyone is watching the phrase even DQ_VARK (1) and BJ_VARK (1).
CN_VA (1) - looks at here friends who are engaged with her pen CO_VARK (1) and DP_VAK (1).
AA_k (2) knows.
DR_Vr (3) is speaking and the teacher is scolding her.
DT_VAK (4) explains the phrase - someone that says something to someone and is not heard.
They copy all (5), except BJ_VARK (5) that never writes.
CN_VA (6) answers, at the same time her friends to the table CO_VARK (6) and DP_VAK (6) speak.
BG_R (7) reads the sentence aloud.
When they write, they sit quietly (8).
Commas come up and they are satisfied of that, looking (9).
CN_VA (10) cannot express herself.
BG_R (11) explains why they put commas that way.
EV_VRK (12) says that FE is the subject.
DP_VAK (13) forgot, BG_R (14) do not know.
BJ_VARK (15) answers correctly.
EU_VARK (16) answers correctly.
DQ_VARK (17) answers about the previous phrase.
They answer in a weak voice, and do not listen to each other (18).
AC_VARK (19) puts the commas right.
BG_R (20) does not answer correctly.
BI_R (21) (Russian blond boy) He reads out aloud.
The teacher asks to read and to puts the commas.
CN_VA (22) answers correctly.
EW_VARK (23) these phrases are fun because you have to think.
DQ_VARK (24) interested in the pictures, from where did they arrive.
AC_VARK (25) gave an example to the expression.

BH_VARK (26) does not answer correctly.
EW_VARK (27) is not precise.
AA_k (28) does not succeed.
CN_VA (29) does not know to explain herself.
Meanwhile, the rest do not listen (30).
EW_VARK (31) explains CN's answer.
EU_VARK (32) and EV_VRK (32) are saying correct.
The teacher says - read the sentence.
AB_ARK (33) does not want to read.
CL_VARK (34) puts the commas correct.
EW_VARK (35) says it's cool, when she hears the phrases, and they are satisfied with it (36), but when they have to write sentences with it, it annoys them (37).
T. - For me it was an experience. There are pupils who usually are not heard, here they are blooming. They usually wait for it.
The teacher says that BI_R is not just a participant but a good participant, and usually does not participate.
BJ_VARK participant and answers correctly, although she usually does not participate.
DQ_VARK participant and answers correct answers.
EW_VARK is sitting with her team and explains to them.
AA_k wrote a story, the teacher says she is learning disabled, but here she is really blooming.
BJ_VARK did not write but was planning something for Purim.
CO_VARK told me - see you Behira.
T. said she did not understand how it works on them that way?

Protocol of observations in Class F in lessons with the presentation

Teacher L. – observes a presentation by Year 6 pupils

Explanations (to the methodology, data collection) where there is an explanation on the table: On the observations recorded by the researcher for any event during the lesson there is a running serial number, in order to allow the researcher to re-read the observation in order to clarify certain points that are not so clear, as for example, listed in the table: Presentation is shown, pupils do not respond to Visual feedback. The number 18 gives the researcher the possibility to return to the observations on the specific date, and check what is written there. Apparently there was an incident, when everyone was tired, pupils from other classes were already on a break, and this gives the researcher an explanation of what happened at that event and why.

22.10.04
In this lesson two presentations (Lesson1 and Lesson2) were screened One after another. During the class the teacher stopped the screening and continued the lesson in a traditional frontal manner – this approach strengthened the knowledge acquired. Each event was assigned a number in brackets in the observation table.
When all the pupils participate and view the presentation, the researcher will write "normal" which means all the pupils are participating without exception. When there are other events in the class and only some pupils participate, the names of those pupils will be specified.

Observations
The pupils seemed happy with what was shown using the overhead projector, and said: "What fun, what a beauty" (1).

At this point all the pupils are copying what they see on the screen into their exercise books and are chatting (2).
When the teacher is holding a discussion, the girls ME_K, MF_RK, LD_VR are chatting among themselves and not paying attention (3).
- The teacher - who can remind us what we learned in the previous lesson?

- NM_VARK – answers, with pattern(4).

- Teacher – OS_VARK is going to tell us about a certain pattern, whichever she chooses.
- OS_VARK chooses to follow verb (5).
A group of pupils, MG_K, LC_VRK and MI_K is not participating and not listening (6).
- LB_VARK - says "increase" (7) and the teacher puts the word in the pattern. She again writes down the root of the verb.
- MF-RK - knows (8).
- MG K and LC_VRK are talking to each other (9).
- The teacher puts MI_K in the corner (10).
- The teacher wrote a new pattern and asked the pupils to insert the verbal root. Then the teachers write another pattern, and then another. Five pupils raised their hands, JT_R (11), OS_VARK (11) LB_VARK (11), OV_R (11) and MF_RK (11). There was a shout from outside and they laughed.
- The teacher has been running the lesson frontally for a long time and writes out another pattern and asks OV_R, (12) and JT_R (12). They answer correctly.
- Might not be disturbing, but certainly not focused and not listen. The group of pupils:
- Two pupils, EV_VRK (12) and LB_VARK (13) are drawing on paper.
- JR_RK reads the verbs (14).
- LC_VRK – also knows the material (15).
- Presentation begins, everyone is looking except the three girls: ME_K (16), MF_RK (16) and LD_VR (16).
- "Lolly the clown" interests MG_K (17).
- Now they are all fed up (18). End of class and we can hear pupils' voices from other classes who are already on recess.
- OT_VARK (19) also answers correctly.

5.11.04
As the lesson proceeds with the presentation on, the teacher asks about the construct table.
- KX_VARK (1) and MG_K (1) do not listen.
- The teachers ask LC_VRK (2) what is the supplement of the reflexive verb (nifal) and he answers ‘ni’.
- The teacher lost the pupils and they are not paying attention and are all talking to each other (3). OS_VARK (3) is lying on the table.
- Now there is a competition between groups. Each group received a verb and needed to tell the construct. The competition was successful (4). The teacher asked the pupil to copy the table on the blackboard into their exercise books (5). Now they are engaged in it except NN_K, MG_K and LB_VARK (6).
- The teacher asked to add a further verb to the table, the pupils that Copy the table do continue (7) and those engaged in other things do not (8).

12.11.04
10.00 am with Lea (1)
In this lesson there is no table because a test was conducted and there was no lesson.
A small test took place which the pupils had to identify verbs and buildings in the story of "Lolly the Clown". The test was to check on class status and whether pupils can identify buildings and verbs.
Teacher arranges fixed places for the kids. She explains the meaning of buildings. All pupils watched the presentation and are excited. (1)

19.11.04
Lesson6
Teacher L. explains the active construct, she tells them about the assessment. She asks how these verbs are in passive construct.
They do not know (1). L. asks the opposite, what are active construct? Three pupils raise their hand: KY (2) VARK KU_A (2) KW_VARK (2). And Lea asks about "closed" "closure" JR (3) RK answers right.
When they reached the sentences and the framework came up, they watched with interest (4), they wrote (5).
A group of girls KV_VARK (6), OS_VARK (6) ME_K (6) are blathering (6). They also continue when working (7). Class is not quiet (5).
L. asks one pupil, MI_K (8) who did not know the answer, and the rest are busy with something else and not listening (9).
The pupils JS-R (10) MI_K (10) are playing with the pencil (10).

26.11.04
Class with L. Friday 9:40

Lesson 7 L. returns the tests and said that there was no such a high average.
L.'s class pupils
OP_VARK interested and listening (1)
Appears in the first sentence (2) then the rule appears, they are looking at the board and copying (3).
OV_R (4) and JT_R (5) - which structure is this? They answer correctly.
Although there are groups, that do not interest them, they fight over who will answer from the group (6).
NN_K (7) do not look on the board
(Note - the teacher could explain to them what the task are, why draw, but she did not do anything with it.)

3.12.04
Lesson with L. 10:00
Presentation 81
Today one table is filled with books and there is a problem with sitting places.
The teacher begins to explain what's going to happen. Girls next to
MI K (1), ME K (1) and LD_VR (1) are chatting. The others laugh at what the pupil makes (2).
Everybody do not listen (3).
The presentation begins and they watch (4).
Two girls – MI_K (5) and ME_K (5) adorn their notebook and do not look (5).
LD-VR – is also busy (6)

24.12.04
L. Lesson 9

We moved on to the presentation no.9. The lesson was focused, she did not look at it at home and did not prefer anything.
The presentation began, all the pupils are watching (1). The teacher asked the pupils to copy from the presentation, they all fulfil the mission (2). The teacher wanted to continue, she asked the pupils to give more examples (3). OV_R (3) and JT_R (3) answered correctly.
They are excited about the paintings (4), but when there are no images they (all pupils) talk to each other (5).
Presentations drawing variables ,short to long, from narrow to wide, the paintings concentrate them all (6). But when she stops they are chatting between themselves (6).

7.01.05
Class with L.

We restarted the presentation from the previous lesson, as long as something appears (1) and making sound (2), they watch (1). LD_VR is busy on something else (3). MI_K and KV_VARK (3), the teacher moved them to another seating place.
The teacher speaks and KW_VARK is talking disturbing (4). When the sentence that includes the pupil with the chick appears (animation, and funny element), it makes them laugh (5).
They watch (6).
The teacher asks the pupils if they remember the pictures that were in the presentation, and to which statement the photos relate.
KW_VARK, NN_K, NJ_K ,KV_VARK, NL_VAR, JR_RK and LC_VRK, NM and MF_RK - remembered the photos (7), OW_VARK and OT_VARK (8), cannot remember the last sentence with the ploughing

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11.02.05
Class with L.: 10:30
There is no order in class yet, started with presentation C in the previous lesson, and now they continue.
ME_K (1) talked with the two friends OS_VARK and KV_VARK.
The teacher explains what is written on the board.
OP_VARK is talking (2), MG_K does not know the answer to (3) What is the word of the direct object "the"
KW_VARK (4) knows and explained.
Teacher wants to get a notebook and write all the prepositions they know, everybody writes (5).
The teacher asks NN_K and NL_VAR to read from the board (6), they are reading.
The painting of the dog in the bathroom Appears, OP_VARK reads the sentence (7).
Teacher - is there a clean verb? OP_VARK answers correct (8).
Teacher - well what is predicate sentence?
KW_VARK says the dog is not the issue (10), a mistake.
JT_R - answers correct (9).
L. - does not speak in the terms of presentation.
The teacher asks NM_VARK (11), and she knows the answer, and there is a mass in class, L. is threatening she will stop the presentation class if they continue to interfere, and the fall silent (12).
Teacher – what is the question to locate the subject?

NN_K explains and answers (13).
L. - the object is a word that comes to the topic or subject matter.
MI_K - (14) answers correctly.
OS_VARK - What is the indirect object (15) - does not know, NN_K also did not know (16).
KW_VARK - answers correctly (17).
She has been a long time with the class frontal learning. Template again.
Maybe do not disturbing, but certainly not focused and are not listening (18)
- Presentation starts, all but two girls at end of room are looking : ME_K and MI_K (19)
JR_RK is interesting in the image (20).
ME_K is asked and she knows the answer (21).
Pupils are marking the subject in notebooks (22).
MF_RK – answers correctly (23), KU_A (24) do not know.
JS_R (25) knows direct object.
Received a sentence with a picture, they were happy with the painting (26).
MI_K and ME_K continue to talk, and are not copying (27).
The teacher asked to copy the sentence and mark it.
The pupils - all write (27) except MI_K (27) and ME_K (27).
KW_VARK says there is no direct object - the answer is incorrect (28).
Teacher - turns to NM_VARK "repeat what I said".
NM_VARK – knows at class (29).
Teacher – KW_VARK "repeat Jana_ RK words". – And he did not know (30).
ME_K will repeat what L. said four times.
She does not know (31), because she is chatting and not listening (32).
Teacher - asking them to write in a notebook and still MI_K did not write (33) and L. says to MI_K to write.

25.2.05

Class with L., presentation C
KX_VARK (1) is interested.
The teacher makes a rehearsal.
MI_K- does not know (2)
NN_K does not know (3) (apparently after an absence)
A sentence with a picture Appears, all without exposition are watching (4).
JS_R - said what a clean verb (5) is.
LC_VRK - answered correctly (6)
LD_VR - knew after they discovered what is the object (7).
LB_VARK - answered correctly (8) the question of what are the titles that accompany the subject.
NM_VARK - knows (9).
The pupils are looking (10). Other pupils arrive at the middle of lesson, they did not bring notebooks, they brought food, L. continues.
Pupils entering classroom, teacher explains and they do not listen (11)
MI_K - knows (12).
She asks to copy all the sentences and explanations below.
L. - asks to write and they write it for a long time (13). They still write and she continues.
Appears a sentence but the kids have other interests and are not interested in the presentation and what it says (14).
She explains and asks a question that is not related to what they have learned.
The girls MF_RK (15) and KV_VARK are speaking and do not listen.
Backward in the presentation and she tries to explain again, it does succeed, they do not listen

(16).
The girls MF_RK (17) and KV_VARK are talking again (17).
They irritate L. because they did not listen, and she gives them a test sentence.
The School committee gave the pupils a Pita, the lesson was a mess and now they go out.

18.03.05

At 10:15 L. goes on with presentation C which was not finished last week, and move to D.
Today they extended the break.
Class may be short, some kids are busy with books form the library.
L. says that after the Passover there would be a test.
Presentation C is turned on and the teacher asks NN_K.
NN_K (1) answers correctly.
JT_R (2) speaks.
KW_VARK (3) speaks.
She asks how we know it's an indirect object. JT_R (4) answers a wrong answer.
KW_VARK (5) do not know.
She asks what is "object"
JS_R (6) answers – attached to an object.
L. - What is the difference between direct and indirect object?
We went to help in the presentation, read aloud, not everyone is looking (7).
Appears a new image, everyone is looking and are interested (8) only
JS_R (9) KW_VARK (9) JT_R (9) talk.
KW_VARK (10) answers – the dinosaur is the subject.
The teacher explains and it seems they do not understand.
A new image appears, but KV_VARK (11) speaks with OS_VARK and ME_K.
Presentation D
The teacher asks to write the sentence.
NM_VARK (12) asks what to do after a long time it appears, everyone writes (13) and the lesson ended.

1.4.05
Presentation E

9:00, a lesson with T..

They look at the paintings, all without exception (1).
KX_VARK (2) - does not answer correctly.
Everybody points (3). 3 pupils, KW_VARK (4) with JS_R (4) and JT_R (4) are painting.
The teacher asks who wants to complete by an indirect object. 3 kids point (5) LB_VARK (5), OV_R (5), Opir_R (5)

- The teacher explains. Do not listen to the teacher (7). When working on the presentation, everyone is listening and answering correctly (8).
The teacher explains again, OV_R (9), KW_VARK (9) are talking. JS_R (9) KW_VARK (9) JT_R (9) do not listen.

- OW_VARK (10) did not answer correctly, the teacher asks the pupils to copy the rules from the presentation to notebook. KW_VARK (11) does not copy, he speaks with JT_R (11).

- She came to the picture of Dudu at the computer. Need to add words and connect to

sentence. Everyone is working (12).

- NM_VARK (13) does not know what it is a glutton.

20.5.05

Lesson F with L. after an absence of more than a month - Passover and Independence Day.

Now 10:20 a presentation F
The teacher says will learn attribute and there will be a test on the subject.
The teacher asks LZ_RK (1) a question from the presentation, LZ_RK did not know and the teacher helps him find this topic first.
There is a picture under the notes, and they need to know and tap the right note.
The teacher does not emphasize and does not explain.
Teacher suggests that they will copy and give an example sentence (2). The class is working (2), except for the boys:
KU_A (2) KW_VARK (2) KX_VARK (2) are talking.
KX_VARK (3), although he was busy with other things, had the answer.

Now the teacher speaks and explains the material, they lie on the tables, dreaming (4).
L. went out for a long time while they write (5) everybody writes.
The teacher returned and she explains again, they are quite happy that they are sitting at a table in a circle. Playing and not listening (6).
The teacher asks KU_A (7) a question and he did not know anything. Not listening (7).
The teacher tells the pupils that there will not be preparations for the test. Asks where NN_K is, does not participate in class probably went out while the lesson was in progress.
Today was really a mess.

5.6.05

I came to administer a questionnaire to Year 6 pupils. I need to give it to Year 5 too.

APPENDIX 9.1:

CLASS TEACHER'S REPORT CONCERNING PUPIL WITH SPECIAL NEEDS

Report on Pupil BJ
Provided by the Class Teacher

The pupil joined our school in Year 5, after almost a year of inconsistent attendance at the previous school in which she was enrolled.

BJ functioned inappropriately in her current classroom and was diagnosed with disabilities in certain learning areas and in social interaction. She was apathetic or inactive during most lessons. She would often refrain from taking part in tests. She refused to write and expressed fear of failure. She was afraid the other children would ridicule her.

BJ failed to meet academic requirements. Her classroom behaviour expressed lack of motivation to learn. Although she did not exhibit disciplinary problems, vocal rebellion or rude behaviour, she simply refused to cooperate and sat most of the time playing with erasers or doodling.

The Subject Teachers reported they could not find the key to a personal relationship with the pupil and tended to send her to the therapeutic teacher, the pupil counsellor or to help performing various functions in the school.

The therapeutic teacher noted BJ was diagnosed with the need for corrective teaching. She could read and write but expressed no interest in her studies. Her IQ should have enabled her to attain at least mediocre achievements but she failed to do so. She did not relate to conventional teaching methods used in the classroom (mainly frontal), but her IQ was clearly not the factor that limited her learning abilities.

Conversations with BJ showed that she treated studies in the classroom as a bother. In teachers' meetings all the teachers that taught this class noted D lacked a positive approach and motivation and couldn't attest to proven learning achievements.

I was astonished at the change in pupil D during the special experimental lessons.

The experimental lesson awoke her interest and she managed to focus her attention on the subject. The pupils also discovered her abilities that had not been expressed in either general lessons or subject lessons where she always seemed to sink into daydreams and indifference to her surroundings. In the experimental lessons, she attentively followed the lesson and when approached, gave answers that proved she had increased her knowledge.

In the experimental lesson, she displayed much will power and thought. She was suddenly observed to be an active participant in the Kinaesthetic work and would raise her hand during many of the presentation sections.

She was able to recall details from the presentation and its contents, and could combine facts, and was even observed asking questions based on information she had obtained and assimilated well from the presentation.

In the achievement tests based on the presentation lessons, for the first time since arriving at the school, she attained very good scores. The other teachers were amazed at these achievements at the grades meeting. They claimed it was impossible for her to have negative grades in other subjects and achievements that were much below average, while in grammar (the subject lesson in which the experimental lessons with the presentation were conducted) she suddenly had achievements far above average. She exhibited creative joy and perseverance in the tasks she carried out with precision.

Another surprising thing was when, to the surprise of both home room teacher and author, BJ wrote of her own initiative over 20 expressions and idioms and their explanation, following the study lesson in which several expressions were taught. She invested much effort in this work, in contrast with the lack of will she usually exhibited in the classroom.

BJ also demonstrated a significant improvement in her social behaviour. In the Kinaesthetic work, she told her teacher, she enjoyed working in cooperation with others and expressed satisfaction with the results of the group work. She was observed taking part in activity of her own initiative and her actions attested to her interest and comprehension. She definitely extended her vocabulary and enhanced her comprehension of grammar foundations. Her works, both the content and aesthetic design, proved that she had found considerable interest in all the subjects studied in the experimental lessons. She managed to concentrate, contributed to the discussion and debate and assimilated solid, precise knowledge.